LANTRONIX®

xPico® WiFi®

Embedded Device Server User Guide

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The information in this guide may change without notice. The manufacturer assumes no responsibility for any errors that may appear in this guide.

Revision History

Date	Rev.	Comments
July 2013	A	Initial document (firmware 1.0.0.0R7).
November 2013	B	Updated serial port information.
January 2014	C	Updated for firmware 1.1.0.2. to include new CPM, diagnostics, modem emulation, monitor, performance, SPI, XML, CLI and command reference information.
February 2014	D	Updated for firmware version 1.1.0.2R10.

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1: Using This Guide

Purpose and Audience

This guide provides the information needed to configure, use, and update the xPico® Wi-Fi® embedded device server. It is intended for software developers and system integrators who are embedding this product into their designs.

Summary of Chapters

The remaining chapters in this guide include:

Chapter	Description
2: Introduction	Main features of the product and the protocols it supports. Includes technical specifications.
3: Configuration Using Web Manager	Instructions for accessing Web Manager and using it to configure settings for the device.
4: Network Settings	Instructions for configuring network settings.
5: Interface Settings	Instructions for configuring various interface settings.
6: Tunnel Settings	Instructions for configuring tunnel settings.
7: Configurable Pin Manager	Information about the Configurable Pin Manager (CPM) and how to set the configurable pins to work with a device.
8: Services Settings	Instructions for configuring HTTP settings.
9: Maintenance and Diagnostics Settings	Instructions to maintain the xPico Wi-Fi, view statistics, files, and diagnose problems.
10: Advanced Settings	Provides additional information on security settings available.
11: Monitor	Instructions for configuring monitor settings.
12: Branding the xPico Wi-Fi Unit	Instructions for branding the Web Manager user interface.
13: Updating Firmware	Instructions for obtaining the latest firmware and updating the xPico Wi-Fi.
Appendix A: Command Reference	Information on configuring settings using XML or the command line interface.
Appendix B: WebAPI	Instructions for viewing status information and configuring a unit through HTTP request.
Appendix C: Technical Support	Instructions for contacting Lantronix Technical Support.
Appendix D: Compliance	Lantronix compliance information.
Appendix E: Binary to Hexadecimal Conversions	Instructions for converting binary values to hexadecimals.

Additional Documentation

Visit the Lantronix Web site at www.lantronix.com/support/documentation for the latest documentation and the following additional documentation.

Document	Description
xPico Wi-Fi Embedded Device Server Integration Guide	Information about the xPico Wi-Fi hardware, testing the device server using the demonstration board, and integrating the unit into your product.
xPico Wi-Fi Evaluation Kit Embedded Device Server Quick Start Guide	Instructions for getting the xPico Wi-Fi unit up and running.
xPico Wi-Fi Evaluation Kit Embedded Device Server User Guide	Information needed to use the xPico Wi-Fi embedded device serer on the evaluation board.

2: Introduction

This chapter summarizes the basic information and features of the xPico Wi-Fi embedded device server.

Key Features

- **Wireless LAN Interface:**
  - IEEE 802.11 b/g and IEEE 802.11n (single stream)
  - WLAN interface (2.4 GHz only)
  - IEEE 802.11 d/h/i/j/k/w/r
  - IEEE 802.11i Support - WEP(Client only), WPA-Personal, WPA2-Personal
  - u.FL connector for external antenna
  - Soft Access Point with DHCP Server
  - Simultaneous SoftAP and Client
  - Roaming: continually tracks Wi-Fi signal strength within range, resulting in smooth and automatic transition between access points without delay.
  - QuickConnect: Dynamic Profiles facilitate easy and rapid connections to access points
- **Host Interface:**
  - **Serial Interface**

    Two Serial CMOS Ports 1200 to 921.6 Kbps

    Flow control: XON/XOFF, RTS/CTS (Line 1 only)

    Lantronix tunneling application

    Modem Emulation Mode
  - **SPI Interface**

    Configurable slave/master SPI interface that can be clocked at 30MHz.
  - **USB Interface 2.0 (device)**

    USB2.0 (12 Mbps) Full Speed Device port interfaces for connection to an upstream USB device.

    Support for USB CDC Serial profile (Future Release, contact Lantronix for more information).
  - **GPIO Interface**

    8 configurable general purpose Input/Output pins

    Custom pin manager
- **Network Protocols:** TCP/IP, UDP/IP, DHCP Server (software-enabled Access Point interface), ARP, ICMP, DHCP Client (WLAN interface), Auto-IP, DNS, HTTP
- **Management and Control:**
  - Web Server

  - CLI (Serial Monitor Port)
  - XML Configuration Import and Export (XCR, XML Status Export [XSR])
  - WebAPI
  - Field upgradable firmware (OTA)
  - Power Management Framework
  - OEM Support Kit
  - Simple Customization and device configuration management
- **Security:**
  - 256-bit AES encryption
- **Architecture:**
  - ARM Cortex-M3 class processor with on-chip Flash and SRAM
  - 1 MB Flash and 128KB SRAM
  - SPI Flash 1 MB
  - Zero Host Load Driver
- **Physical Interface:** 40-pin Board-to-Board SMT Connector
- **Certifications:** FCC, IC, EU, Japan, UL, CE
- **Warranty:** 5-Year Limited

Protocol Support

The xPico Wi-Fi embedded device server contains a full-featured IP stack. Supported protocols include:

- IEEE 802.11 b/g and IEEE 802.11n (single stream) WLAN interface (2.4 GHz only)
- 802.11i - WPA-Personal, WPA2-Personal
- Soft-AP with DHCP Server
- HTTP Server
- TCP/IP, UDP/IP, DHCP Server (Software enabled Access Point interface), ARP, ICMP, DHCP Client (WLAN interface), Auto-IP, DNS

Troubleshooting Capabilities

The xPico Wi-Fi device offers the abilty to view Trouble Log messages (see *Line Settings on page 30*).

Configuration Methods

After installation, the xPico Wi-Fi embedded device server requires configuration. For the unit to operate correctly on a network, it must have a unique IP address on the network. These methods may be used for logging into the xPico Wi-Fi and assigning IP addresses and other configurable settings:

- **Web Manager**: View and configure settings easily through a web browser using the Lantronix Web Manager. *See "Configuration Using Web Manager" on page 17.*
- **XML:** The xPico Wi-Fi supports XML import and XML export through a terminal emulator software such as Tera Term. *See "XML Import and XML Export" on page 52.*
- **Command Mode:** Access the Command Mode (CLI) by connecting a PC or other host running a terminal emulation program to the unit's serial port. *See "Command Reference" on page 70.*

Addresses and Port Numbers

Hardware Address

The hardware address is also referred to as the physical address or MAC address. Sample hardware address:

- `00-80-A3-FF-FF-FF`
- `00:80:A3:FF:FF:FF`

IP Address

Every device connected to an IP network must have a unique IPv4 address. This address references the specific unit.

Port Numbers

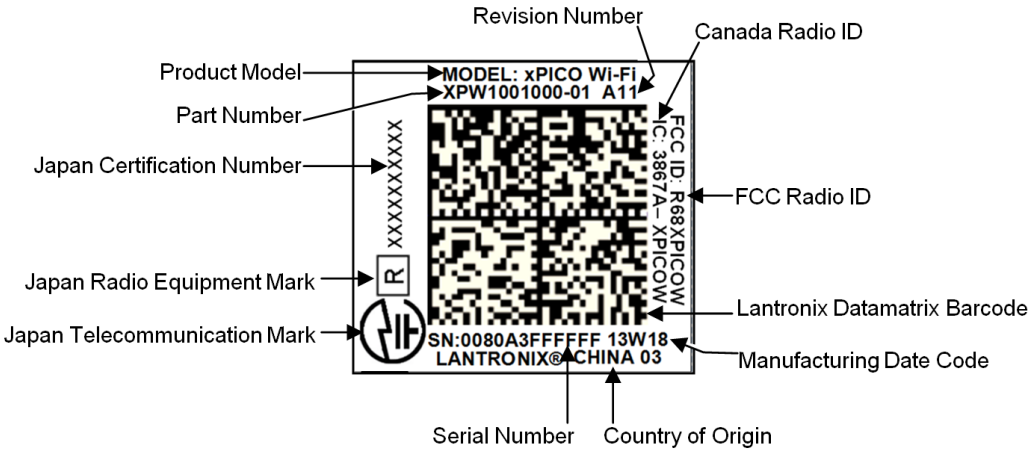
- TCP Port 80: HTTP Server (Web Manager configuration)
- TCP Port 10001: Tunnel (Line 1)
- TCP Port 10002: Tunnel (Line 2)

Product Information Label

The product information label on the unit contains the following information about the specific unit:

- Lantronix Datamatrix Code
- Product Revision
- Part Number
- Serial Number Hardware Address (MAC Address)
- Manufacturing Date Code

Figure 2-1 xPico Wi-Fi Product Label



3: Configuration Using Web Manager

This chapter describes how to configure the xPico Wi-Fi embedded device server using Web Manager, the Lantronix browser-based configuration tool. The unit's configuration is stored in nonvolatile memory and is retained without power. All changes take effect immediately, unless otherwise noted. It contains the following sections:

- *Accessing Web Manager*
- *Web Manager Components*
- *Navigating Web Manager*

Accessing Web Manager

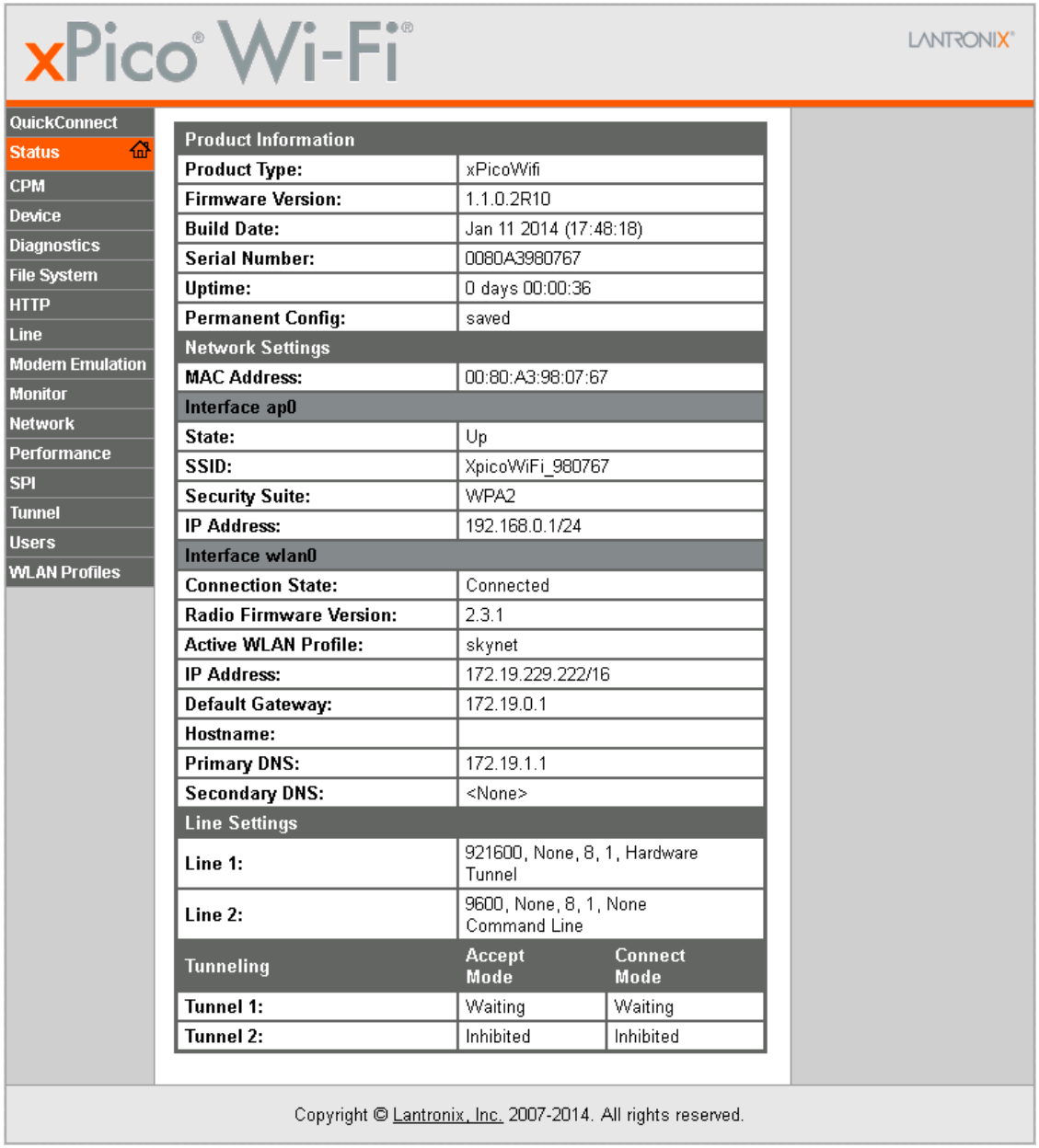
To access Web Manager, perform the following steps:

1. Open a standard web browser. Lantronix supports the latest version of Internet Explorer, Mozilla Firefox, Safari or Chrome browsers.
2. Enter the IP address or hostname of the xPico Wi-Fi in the address bar. The IP address may have been assigned manually or automatically by DHCP.
3. Enter your username and password.The factory-default username is "**admin**" and the password is "**PASSWORD**" (all capitalized). The Status web page displays product information, network settings, line settings, and tunneling settings.

Status Page

The Status page is the first to appear after you log into Web Manager. The Status page also appears when you click **Status** tab in Web Manager.

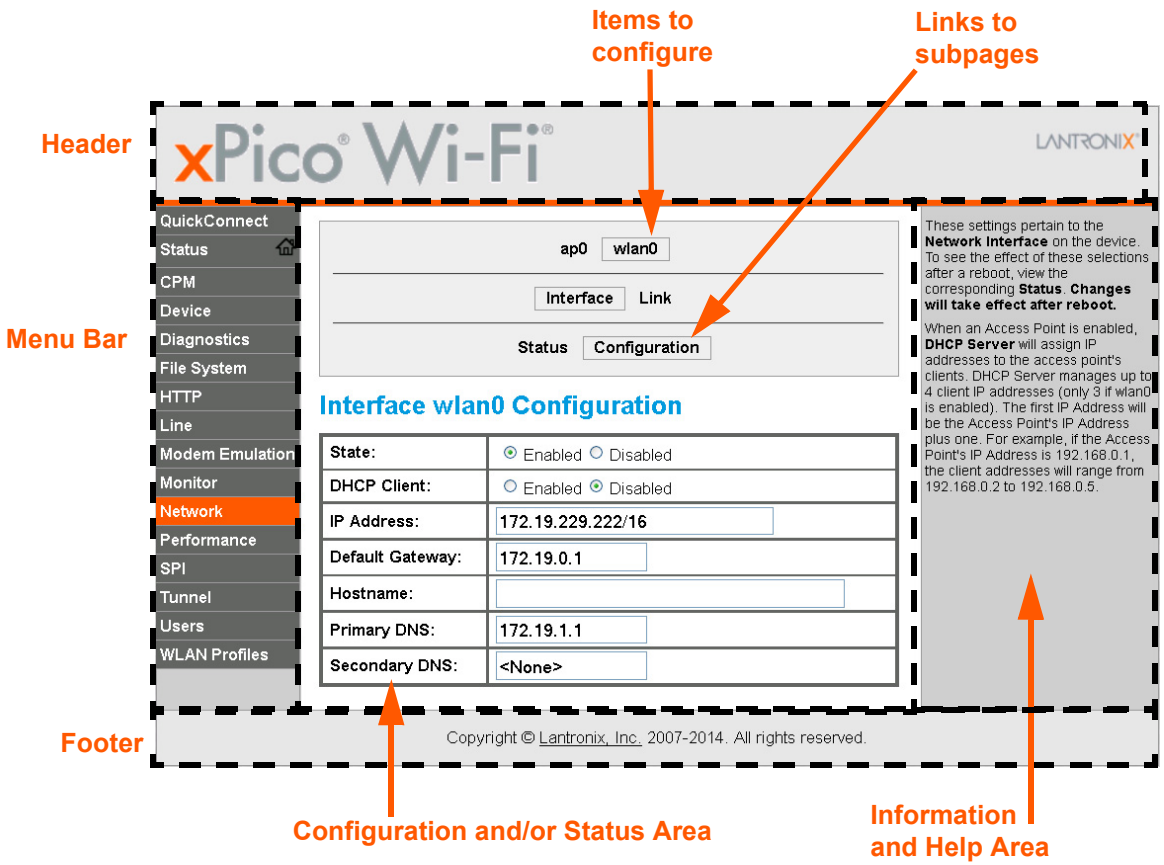
Figure 3-1 Status Page



Web Manager Components

The layout of a typical Web Manager page is below.

Figure 3-2 Components of the Web Manager Page



Navigating Web Manager

The Web Manager provides an intuitive point-and-click interface. A menu bar on the left side of each page provides links you can click to navigate between pages. Some pages are read-only, while others let you change configuration settings.

Note: *There may be times when you must reboot the xPico Wi-Fi for the new configuration settings to take effect. The chapters that follow indicate when a change requires a reboot. Anytime you reboot the unit, this operation will take some time to complete. Please wait a minimum of 10-20 seconds after rebooting the unit before attempting to make any subsequent connections.*

Table 3-3 Web Manager Pages

Web Manager Page	Description	See Page
Status	Shows product information, network, line status, and tunneling settings.	*18*
CPM	Shows information about the Configurable Pins Manager (CPM) and how to set the configurable pins and roles to work with a device.	*43*
Device	Lets you reboot the device, restore factory defaults and upload new firmware.	*49*
Diagnostics	Lets you perform various diagnostic procedures.	*51*
File System	Shows file system statistics and lets you perform file system operations.	*48*
HTTP	Shows HyperText Transfer Protocol (HTTP) status and lets you change the current configuration and authentication settings.	*46*
Line	Shows statistics and lets you change the current configuration and Command mode settings of a serial line.	*34*
Modem Emulation	Lets you view and configure Modem Emulation.	*40*
Monitor	Lets you query and capture information during serial port to serial device connection.	*55*
Network	Shows status and lets you configure the network interface.	*21*
Quick Connect	Lets you scan for available network in vicinity and create WLAN profile easily.	*28*
Performance	Lets you change settings effecting performance.	*53*
SPI	Lets you configure SPI settings.	*32*
Tunnel	Lets you change the current configuration settings for an incoming tunnel connection.	*34*
Users	Lets you configure Admin User password.	*50*
WLAN Profiles	Lets you view, edit, delete and create a WLAN profile on a device.	*25*

4: Network Settings

The Network Settings show the status of the Software enabled Access Point (SoftAP) or WLAN interface/link and let you configure the settings on the device. Interface settings are related to the configuration of the IP and related protocols. Link settings are related to the physical link connection, which carries the IP traffic.

The xPico Wi-Fi embedded device server contains two network interfaces. The Software enabled Access Point interface is also called interface 1 or ap0, and the WLAN interface is called interface 2 or wlan0.

Note: *All network settings require a reboot to take effect. Wait a minimum of 20 seconds after rebooting the unit before attempting to make any subsequent connections.*

Network 1 Interface (ap0) Configuration

Table 4-1 shows the network interface settings that can be configured. These settings apply to the Software enabled Access Point (ap0) interface.

Table 4-1 Network Interface Settings

Network (ap0) Interface Settings	Description
State	Click to enable or disable the SoftAP. If enabled, the DHCP server will assign IP addresses to the SoftAP's clients. A maximum of four clients can be connected to the SoftAP interface if the STA interface is disabled. If the STA interface is enabled a maximum of three clients may be connected. ***Note:*** *A DHCP lease lasts for a day. If the IP network is managed manually, a static IP can be used outside the range of the DHCP address pool.*
IP Address	Enter the static IP address to use for the interface. You may enter it in one of the following ways: ◆ Alone (i.e., `192.168.1.1`) ◆ In CIDR format (i.e., `192.168.1.1/24`) ◆ With an explicit mask (i.e., `192.168.1.1 255.255.255.0`)

To Configure Network 1 Interface Settings

Using Web Manager

- To modify Software enabled Access Point (ap0) settings, go to **Network** on the menu and select **ap0 -> Interface -> Configuration**.

Using CLI

- To enter the Interface command level: `config -> Interface <instance>`

Using XML

- Include in your file: `<configgroup name = "Interface" instance = "ap0">`

To View Network 1 Interface Status

Using Web Manager

In Network Interface Status, you can view both the current operational settings as well as the settings that would take effect upon a device reboot.

- To view current access point (ap0) settings, go to **Network** on the menu and select **ap0 -> Interface -> Status**.

Using CLI

- To enter the Interface command level: `status -> Interface <instance>`

Using XML

- Look for the status header: `<statusgroup name = "Interface" instance = "ap0">`

Network 1 (ap0) Link Settings

Physical link parameters can be configured for an access point (ap0) Network Interface (see *Table 4-2*).

Table 4-2 Network 1 (ap0) Link Settings

Network 1 (ap0) Link Settings	Description
SSID	Specify the name of the wireless network (SSID) for the SoftAP.
Channel	Specify the channel for the SoftAP.
Suite	Specify the security suite to be used for the SoftAP. ◆ **None** = no authentication or encryption method will be used. ◆ **WPA** = WiFi Protected Access ◆ **WPA2** = Robust Secure Network.
Encryption	Select one or more encryption types, listed from strongest to least strong. ◆ **CCMP** = Uses AES as basis and is the strongest encryption option. ◆ **TKIP** = Uses WEP as the basis, but adds extra checks and variations for added protection.
Passphrase	Select the passphrase which may consist of up to 63 characters. ***Note:*** *This configuration option becomes available only when suites WPA or WPA2 are selected. Lantronix recommends using a passphrase of 20 characters or more for maximum security. Spaces and punctuation characters are permitted. The passphrase input is not the same as ASCII input (as used on some products.) ASCII is translated directly into hexadecimal bytes according to the ASCII table, while a possibly larger passphrase is hashed into a key and provides better security through a larger range of key values.*

Network 1 (ap0) Link Settings (continued)	Description
Mode	Select the desired mode for the link connection from the drop-down menu: ◆ **Always Up**: when enabled, the SoftAP is always on. ◆ **Triggered**: when enabled, the SoftAP operates in Triggered mode. Triggered AP mode is a means to enable the xPico Wi-Fi SoftAP via a hardware signal. This allows a user to have the SoftAP operating only when an external signal/button is activated. This might be useful when power consumption is a concern yet the SoftAP is needed. One potential use is device provisioning. When triggered, the SoftAP will remain active for the configured uptime waiting for a client to connect. If no client connects before the uptime expires, the SoftAP goes back down. If one or more clients connect, the SoftAP will remain active until the last client disconnects, at which point it will go down. Refer to *Chapter 7: Configurable Pin Manager* for details on how to set up the xPico Wi-Fi unit for this feature
Uptime	Enter the length of uptime for the link connection.

To Configure Network 1 Link Settings

Using Web Manager

- To modify network (ap0) Link information, click **Network** on the menu and select **apo > Link > Configuration**.

Using CLI

- To enter the Access Point command level: `config -> Access Point`

Using XML

- Include in your file: `<configgroup name = "Access Point" instance = "ap0">`

To View Network 1 Link Status

Using Web Manager

In Network Link Status, you can view the current operational settings.

- To view current network (ap0) settings, go to **Network** on the menu and select **ap0 -> Link -> Status**.

Using CLI

- To enter the Access Point command level: `status -> Access Point`

Using XML

- Look for the status header: `<statusgroup name = "Access Point" instance = "ap0">`

Network 2 (wlan0) Interface Configuration

This page is used to configure the network 2 interface on the device. To see the effect of these items after a reboot, view the Status page.

Table 4-3 Network Interface Settings

Network Interface Settings	Description
State	Click to enable or disable the WLAN interface.
DHCP Client	Click to enable or disable the DHCP client. If enabled, any configured IP address, network mask, gateway or hostname will be ignored. DHCP will auto-discover and eclipse those configured items. When DHCP fails to discover an IP address, a new address will automaticaly be generated using AutoIP. This address will be within the `169.254.x.x` space. At boot up, after the physical link is up, the xPico Wi-Fi will attempt to obtain IP settings from a DHCP server and will periodically renew these settings with the server. ***Note:*** *Click renew on Interface Status page to force DHCP lease renewal.*
IP Address	Enter the static IP address to use for the interface. You may enter it in one of the following ways: ◆ Alone (i.e., `192.168.1.1`) ◆ In CIDR format (i.e., `192.168.1.1/24`) ◆ With an explicit mask (i.e., `192.168.1.1 255.255.255.0`) ***Note:*** *This setting will be used if Static IP is active (DHCP Client is **Off**).*
Default Gateway	Enter the IP address of the router for this network. ***Note:*** *This setting will be used if Static IP is active (DHCP Client is **Off**).*
Hostname	Enter the hostname for the interface. It must begin with a letter, continue with a letter, number or hyphen, and must end with a letter or number. The device will not register the hostname with a DNS server until the next reboot**.**
Primary DNS	Enter the IP address of the primary Domain Name Server. ***Note:*** *This setting will be used when Static IP is active.*
Secondary DNS	Enter the IP address of the secondary Domain Name Server. ***Note:*** *This setting will be used when Static IP is active.*

To Configure Network 2 Interface Settings

Using Web Manager

- To modify network 2 WLAN interface information, click **Network** on the menu and select **wlan0 > Interface > Configuration**.

Using CLI

- To enter the Interface command level: `config -> Interface <instance>`

Using XML

- Include in your file: `<configgroup name = "Interface" instance = "wlan0">`

To View Network 2 Interface Status

Using Web Manager

In Network Interface Status, you can view both the current operational settings as well as the settings that would take affect upon a device reboot.

- To view current access piont (ap0) settings, go to **Network** on the menu and select **wlan0 -> Interface -> Status**.

Using CLI

- To enter the WLAN command level: status -> WLAN

Using XML

- Look for the status header: `<statusgroup name = "Interface" instance = "wlan0">`

Network 2 (wlan0) Link Status

This page shows status of a Link on the device.

To View Network 2 Link Status

Using Web Manager

- To view network 2 link interface information, click **Network** on the menu and select **wlan0 > Link > Status.**

Using CLI

- To enter the WLAN command level: `status -> WLAN`

Using XML

- Include in your file: `<configgroup name = "Interface" instance = "wlan0">`

WLAN Profiles

A WLAN profile defines all of the settings necessary to establish a wireless connection with an access point (in infrastructure mode). A maximum of four profiles can exist on the xPico Wi-Fi embedded device server at a time and only one profile may be active at any given time.

The xPico Wi-Fi device supports dynamic profiles. Dynamic Profiles are the ones created via QuickConnect.

WLAN Profile WEP Settings

WEP is a simple and efficient security mode encrypting the data via the RC4 algorithm. However, WEP has become more vulnerable due to advances in hacking technology. State of the art equipment can find WEP keys in five minutes. For stronger security, please use WPA, or better, WPA2 with AES (CCMP). WEP is only supported on the STA interface.

WLAN Profile WPA and WPA2 Settings

WPA is a security standard specified by the WiFi Alliance and is a close derivative of an early draft of the IEEE802.11i specification. WEP was becoming vulnerable when finalizing the IEEE802.11i standard was still far away. WPA2 is WiFi's subset of the broad IEEE802.11i standard to enforce better interoperability. The xPico Wi-Fi embedded device server is compliant with both WPA2 and IEEE802.11i.

To Configure WLAN Profiles

You can view, edit, create or delete a WLAN profile.

Using WebManager

- Click **WLAN Profiles** on the menu.

Using CLI

- To enter the WLAN Profile command level: `config -> WLAN Profile <instance>`

Using XML

- Include in your file: `<configgroup name = "WLAN Profile" instance = "name">`

Table 4-4 Creating, Deleting or Enabling WLAN Profiles

WLAN Profile Basic Settings	Description
Create new profile	Type the name of the new profile to be created into the **Create new WLAN Profile** field. Then, click the **Submit** button which appears to create the profile. Once created, the profile name may be clicked so you may edit profile settings.
Delete (checkbox)	Click the **Delete** checkbox beside the profile(s) to be deleted. Two buttons will appear: ◆ Click the **Apply** button to delete the profile for testing purposes. If the device reboots, this change will not be applied. ◆ Click the **Submit** button to permanently delete profile(s).
View or Edit (link to specific profile)	Click on a specific WLAN Profile name to edit the WLAN profile basic settings.

To Configure WLAN Profile Settings

Using Web Manager

- To view or edit an existing WLAN profile, click **WLAN Profiles** on the menu and select an existing profile (see *Table 4-5*, *Table 4-6* and *Table 4-7*).

Using CLI

- To enter the WLAN Profile command level: `config -> WLAN Profile <instance>`

Using XML

- Include in your file: `<configgroup name = "WLAN Profile" instance = "name">`

Table 4-5 WLAN Profile Basic Settings

WLAN Profile Basic Settings	Description
Network Name (SSID)	Specify the name of the wireless network (SSID.)
State	Select to enable or disable this profile.

Table 4-6 WLAN Profile Security Settings

WLAN Profile Security Settings	Description
Suite	Specify the security suite to be used for this profile. ◆ **None** = no authentication or encryption method will be used. ◆ **WEP** = Wired Equivalent Privacy ◆ **WPA** = WiFi Protected Access ◆ **WPA2** = Robust Secure Network.
Key Size	Select the appropriate key size in bits. Select 40 for WEP40 and WEP64; select 104 for WEP104 and WEP128. ***Note:*** *This option is available if WEP suite is selected above.*
TX Key Index	Select one of four index listing keys for transmitting data. Reception is allowed with all four keys. ***Note:*** *For operability with some products that generate four identical keys from a passphrase, this index must be one. This option is available if WEP suite is selected above.*
Key 1-4	Enter one or more encryption keys in hexadecimal format. Enter 10 hexadecimal digits (0-9, a-f) for WEP40 and 26 for WEP104. The configured keys are not shown for security reasons. ***Note:*** *This option is available if WEP suite is selected above.*
WPAx Key Type	Select the format of the security key. ***Note:*** *This configuration option becomes available only when suites, WPA or WPA2 are selected.*
WPAx Key	Enter the WPAx key. ***Note:*** *This configuration option becomes available only when suites, WPA or WPA2 are selected and the Hex key type is selected.*

WLAN Profile Security Settings	Description
WPAX Passphrase	Select the password consists of up to 63 characters. ***Note:*** *Lantronix recommends using a passphrase of 20 characters or more for maximum security. Spaces and punctuation characters are permitted. The passphrase input is not the same as ASCII input (as used on some products.) ASCII is translated directly into hexadecimal bytes according to the ASCII table, while a possibly larger passphrase is hashed into a key and provides better security through a larger range of key values. This configuration option becomes available only when suites, WEP, WPA or WPA2 are selected.*
WPAx Encryption	Select one or more encryption types, listed from strongest to least strong. At least one selection will have to match the Access Points intended to connect with. ◆ **CCMP** = Uses AES as basis and is the strongest encryption option. ◆ **TKIP** = Uses WEP as the basis, but adds extra checks and variations for added protection. ***Note:*** *In case the encryption settings on the Access Point(s) can still be chosen, the capabilities of the Access Point(s) and the other clients that need to use the network need to be taken into account.This configuration option becomes available only when suites WPA or WPA2 are selected.*

Table 4-7 WLAN Profile Advanced Settings

WLAN Profile Advanced Settings	Description
TX Power Maximum	Specify the maximum transmission output power in dBm.
Power Management	Select to **Enable** or **Disable** power management, which reduces the overall power consumption of the xPico Wi-Fi unit, but can increase latency. ◆ **Enabled** = allows the xPico Wi-Fi to turn off the receiver when it is idling. ◆ **Disabled** = keeps the receiver on at all times.
Power Management Interval	Select number of beacons (100 msec interval) between 1 and 5. The above-mentioned latency can be up to this number “X” 100 msec.

WLAN Quick Connect

WLAN QuickConnect allows users to view and add up to four WLAN profiles from a list of up to 20 wireless devices sorted by RSSI. Details of the selected network are pre-populated, so little or no configuration is required by the user.

To Configure WLAN Quick Connect

Using Web Manager

- To view or edit an existing WLAN Quick Connect settings, click **QuickConnect** on the menu.

Using CLI

- Not applicable.

Using XML

- Not applicable.

Table 4-8 WLAN Quick Connect

WLAN Quick Connect Settings	Description
Network Name (search field)	Enter a network name and click Scan to search for a network.
Scan "<network SSID>"	Perform a scan for devices within range of the xPico Wi-Fi. Including the optional network SSID limits the scan to devices configured with the specified network SSID. Omitting the network SSID performs a scan for all devices in range.
Network Name (link)	Lists the SSID of a network. Click a specific **Network Name** to display the Quick Connect profile. If you provide the **Password** for a specific Quick Connect Profile, you can add that profile to your list of *WLAN Profiles*. Up to four WLAN profiles may be added, and only one may be connected at any given time.
BSSID	Lists the basic service set identifier. This is a unique 48-bits address that identifies the access point that creates the wireless network.
CH	Provides the channel number of a network.
RSSI	Displays an instantaneous value indicating the signal strength of the network. The best to worst signal strength is indicated by green, yellow and red respectively. ***Note:*** *RSSI reported in scan results is a single sampling.*
Security Suite	Lists the security suite of a network (e.g., WEP, WPA, WPA2).

5: Interface Settings

Line Settings

The Line Settings allow configuration of the serial lines (ports). Some settings may be specific to only certain lines. Such settings are noted below.

Note: *The settings described below apply to both Line 1 and Line 2 unless otherwise noted.*

Table 5-1 Line Configuration Settings

Line Settings	Description
Name	Enter a name or short description for the line, if desired. By default, there is no name specified. A name that contains white space must be quoted.
State	Select to **Enable** or **Disable** the operational state of the Line. The default is an enabled state.
Protocol	Set the operational protocol for the Line. The default is **Tunnel** for Line 1 and Command Line for Line 2. Choices are: ◆ **Command Line** ◆ **Modem Emulation** ◆ **Monitor** ◆ **None** ◆ **Trouble Log** ◆ **Tunnel** = Serial-Network tunneling protocol (Line 1 only)
Baud Rate	Set the Baud Rate (speed) of the Line. The default is **9600**. A custom speed or any set speed between 1200 and 921600 may be selected: 1200, 2400, 4800, 9600, 19200, 38400, 57600, 115200, 230400, 460800, 921600. If a custom speed is selected, indicate the bits per second in the field which appears.
Parity	Set the Parity of the Line. The default is **None**. ***Note:*** *Serial lines do not support the following Data Bit/Parity combinations:* *a) 7 Data Bits with No Parity and 1 Stop Bit.* *b) 8 Data Bits with 2 Stop Bits.*
Data Bits	Set the number of data bits for the Line. The default is **8**. ***Note:*** *Serial lines do not support the following Data Bit/Parity combinations:* *a) 7 Data Bits with No Parity and 1 Stop Bit.* *b) 8 Data Bits with 2 Stop Bits.*
Stop Bits	Set the number of stop bits for the Line. The default is **1**.
Flow Control	Set the flow control for the Line. The default is **None**. Hardware flow control is only supported on Line 1.
Xon Char	Specify the Xon Character which is used when Flow Control is set to Software. Set the prefix in one of the three ways: ◆ Prefix decimal with prefix hexadecimal and 0x ◆ Prefix hexadecimal with 0x ◆ Prefix as a single control character with <control>

Line Settings	Description
Xoff Char	Specify the Xoff Character which is used when Flow Control is set to Software. Set the prefix in one of the three ways: ◆ Prefix decimal with prefix hexadecimal and 0x ◆ Prefix hexadecimal with 0x ◆ Prefix as a single control character with <control>
Gap Timer	Set the Gap Timer delay to Set the number of milliseconds to pass from the last character received before the driver forwards the received serial bytes. By default, the delay is four character periods at the current baud rate (minimum 1 msec). Gap Timer range is 1 to 5000 milliseconds.
Threshold	Set the number of threshold bytes which need to be received in order for the driver to forward received characters. Default value is 56 bytes.

To Configure Line Settings

Note: *The following section describes the steps to view and configure Line 1 settings; these steps apply to other line instances of the device.*

Using Web Manager

- To configure a specific line, click **Line** in the menu and select **Line 1 -> Configuration** (*Table 5-1*).

Using CLI

- To enter the Line command level: `config -> Line <instance>`

Using XML

- Include in your file: `<configgroup name = "Line" instance = "1">`

To View Line Status

Using Web Manager

- To view statistics for a specific line, click **Line** in the menu and select **Line 1 -> Status**.

Using CLI

- To enter the Line command level: `status -> Line <instance>`

Using XML

- Look for the status header: `<statusgroup name = "Line" instance = "1">`

Serial Perpheral Interface (SPI) Settings

SPI settings pertaining to the bus master device can be modified in the xPico Wi-Fi unit. SPI settings, like line settings, allow for the selection of a protocol to be used with SPI. Changes take effect immediately.

Table 5-2 SPI Configuration Settings

Line Settings	Description
Name	Enter a name or short description for the line, if desired. By default, there is no name specified. This name is for display only.
State	Select to **Enable** or **Disable** the SPI.
Protocol	Select the operational protocol for connection to the SPI: ◆ **None**: selects no application to connect to the SPI. ◆ **Monitor**: selects Monitor application to connect to the SPI.
Target Speed	Set the target clock speed of the SPI in Hz (range is 234.375 KHz - 30 MHz). The target speed may be lowered to the closest operating speed capability of the device. If so, a warning will be noted. 0 or clearing the selection selects the minimum speed.
Idle Clock Level	Select the level of the clock or clock polarity (CPOL) when the clock is idle: ◆ **Low**: the idle clock is at a low level. This is equivalent to CPOL=0. ◆ **High**: the idle clock is at a high level. This is equivalent to CPOL=1.
Clock Edge	Select the clock edge or clock phase (CPHA) for latching data: ◆ **First**: each bit is latched on the first edge of the clock. This is equivalent to CPHA=0. ◆ **Second**: each bit is latched on the second edge of the clock. This is equivalent to CPHA=1.
Bits Per Word	Select the number of bits per word to transfer. Choices in drop-down menu are 8 or 16.
First Transfer	Select the first transfer bit of each word. Choicse in drop-down menu include: ◆ Most Significant Bit ◆ Least Signficant Bit

To Configure SPI Settings

Using Web Manager

- To configure the SPI bus master device settings, click **SPI** in the menu and select **Configuration**.

Using CLI

- To enter the SPI command level: `config -> SPI`

Using XML

- Include in your file: `<statusgroup name = "SPI" instance = "1">`

To View SPI Status

Using Web Manager

- To view the current status and statistics for the SPI bus master device, click **SPI** in the menu and select **Status**.

Using CLI

- To enter the SPI command level: `status -> SPI`

Using XML

- Include in your file: `<statusgroup name = "SPI" instance = "1">`

6: Tunnel Settings

The xPico Wi-Fi embedded device server has two lines available for tunneling.

Tunnel Settings

Tunneling allows serial devices to communicate over a network, without "being aware" of the devices which establish the network connection between them. Tunneling parameters are configured using the **Tunnel** menu and submenus. The Tunnel settings allow you to configure how the Serial-Network tunneling operates.

Note: *The following section describes the steps to view and configure Line 1 settings; these steps apply to other line instances of the device.*

Line Settings

These serial settings for the tunnel apply to the Serial Line interface. The Line Settings and Protocol are displayed for informational purposes and must be configured from the Line settings.

Table 6-1 Tunnel Line Settings

Tunnel Serial Settings	Description
Line Settings	Line Settings information here is display only. Go to the section, *To Configure Line Settings* to modify these settings.
Protocol	Protocol information here is display only. Go to the section, *To Configure Line Settings* to modify these settings.
DTR	Select the DTR conditions in which Data Terminal Ready control signal on the Serial Line is asserted. ◆ **Asserted while connected** (Causes DTR to be asserted whenever either a connect or an accept mode tunnel connection is active). ◆ **Continuously asserted** ◆ **Unasserted**

To View Tunnel Serial Settings

Using Web Manager

- To view the Serial Settings for a specific tunnel, click **Tunnel** in the menu and select **Tunnel 1 -> Line**.

Using CLI

- To enter the Tunnel command level: `config -> Tunnel <instance>`

Using XML

- Include in your file: `<configgroup name = "Tunnel Line" instance = "1">`

Packing Mode

With Packing, data from the serial Line is not sent over the network immediately. Instead, data is queued and sent in segments, when either the timeout or byte threshold is reached. Packing applies to both Accept and Connect Modes.

Table 6-2 Tunnel Packing Mode Settings

Tunnel Packing Mode Settings	Description
Mode	Configure the Tunnel Packing Mode. Choices are: ◆ **Disable** = Data not packed. ◆ **Timeout** = data sent after timeout occurs. ◆ **Send Character** = data sent when the Send Character is read on the Serial Line.
Timeout	Set the timeout value, in milliseconds, after the first character is received on the serial line, before data is sent on the network. Valid range is 1 to 30000 milliseconds. Default is 1000. ***Note:*** *This configuration option becomes available when Timeout is the selected Mode.*
Threshold	Set the threshold (byte count). If the received serial data reaches this threshold, then the data will be sent on the network. Valid range is 100 to 1450 bytes. Default is 512. ***Note:*** *This configuration option becomes available when Timeout is the selected Mode.*
Send Character	Enter Control Characters in any of the following forms: ◆ <control>J ◆ 0xA (hexadecimal) ◆ \10 (decimal) If used, the Send Character is a single printable character or a control character that, when read on the Serial Line, forces the queued data to be sent on the network immediately. ***Note:*** *This configuration option becomes available when Send Character is the selected Mode.*
Trailing Character	Enter Control Characters in any of the following forms: ◆ <control>J ◆ 0xA (hexadecimal) ◆ \10 (decimal). If used, the Trailing Character is a single printable character or a control character that is injected into the outgoing data stream right after the Send Character. Disable the Trailing Character by blanking the field (setting it to <None>). ***Note:*** *This configuration option becomes available when Send Character is the selected Mode.*

To Configure Tunnel Packing Mode Settings

Using Web Manager

- To configure the Packing mode for a specific tunnel, click **Tunnel** in the menu and select **Tunnel 1 -> Packing**.

Using CLI

- To enter the Tunnel command level: `config -> Tunnel <instance>`

Using XML

- Include in your file: `<configgroup name = "Tunnel Packing" instance = "1">`

Accept Mode

In Accept mode, the xPico Wi-Fi listens (waits) for incoming connections from the network. A remote node on the network initiates the connection.

The configurable local port is the port the remote device connects to for this connection. There is no remote port or address. The default local port is 10001.

Serial data can still be received while waiting for a network connection, keeping in mind serial data buffer limitations.

Table 6-3 Tunnel Accept Mode Settings

Tunnel Accept Mode Settings	Description
Mode	Set the method used to start a tunnel in Accept mode. Choices are: ◆ **Disable** = do not accept an incoming connection. ◆ **Always** = accept an incoming connection (*default*). ◆ **Any Character** = start waiting for an incoming connection when any character is read on the serial line. ◆ **Start Character** = start waiting for an incoming connection when the start character for the selected tunnel is read on the serial line.
Local Port	Set the port number for use as the network local port. The default local port is 10001.
Protocol	Select the TCP type for use with Accept Mode.
Start Character	Enter the start character which will enable the tunnel to listen for a network connection. The start character may be designated as a single printable character or as a control character. Control characters may be input in any of the following forms: `<control>J` or `0xA (hexadecimal)` or `\10 (decimal)` ***Note:*** *This configuration option becomes available when Start Character is the selected Mode.*

Tunnel Accept Mode Settings (continued)	Description
Flush Start Character	Enable or disable the flush start character: ◆ **Enabled** = prevents forwarding of a start character from the Line into the network. ◆ **Disabled** = the flush start character allows forwarding of a start character from the line into the network. ***Note:*** *This configuration option becomes available when Start Character is the selected Mode.*
Flush Line	Set whether the serial line data buffer is flushed upon a new network connection. Choices are: ◆ **Enabled** = serial data buffer is flushed on network connection ◆ **Disabled** = serial data buffer is not flushed on network connection (*default*)
Block Line	Set whether Block Line is enabled for debugging purposes. Choices are: ◆ **Enabled** = if Enabled, incoming characters from the serial line will not be forwarded to the network. Instead, they will be buffered and will eventually flow off the serial line if hardware or software flow control is configured. ◆ **Disabled** = this is the default setting; incoming characters from the Serial Line are sent into the network. Any buffered characters are sent first.
Block Network	Set whether Block Network is enabled for debugging purposes. Choices are: ◆ **Enabled** = if Enabled, incoming characters from the network will not be forwarded to the Serial Line. Instead, they will be buffered and will eventually flow off the network side. ◆ **Disabled** = this is the default setting; incoming characters from the network are sent on the Serial Line. Any buffered characters are sent first.
Password	Enter a password. This password can be up to 31 characters in length and must contain only alphanumeric characters and punctuation. When set, clients must send the correct password string to the unit within 30 seconds from opening network connection in order to enable data transmission. The password sent to the unit must be terminated with one of the following: ◆ 0A (Line Feed) ◆ 00 (Null) ◆ 0D 0A (Carriage Return/Line Feed) ◆ 0D 00 (Carriage Return/Null) If, **Prompt for Password** is set to **Enabled** and a password is provided, the user will be prompted for the password upon connection.

To Configure Tunnel Accept Mode Settings

Using Web Manager

- To configure the Accept Mode for a specific tunnel, click **Tunnel** in the menu and select **Tunnel 1 -> Accept**.

Using CLI

- To enter the Tunnel command level: `config -> Tunnel <instance>`

Using XML

- Include in your file: `<configgroup name = "Tunnel Accept" instance = "1">`

Connect Mode

Specifies the conditions for connecting any Accept Mode connection that may be established locally.

Table 6-4 Tunnel Connect Mode Settings

Tunnel Connect Mode Settings	Description
Mode	Select the method to start the Connect Tunnel: ◆ Disabled: never started. ◆ Always: always started ◆ Any Character: started when any character is detected on the Serial Line ◆ Start Character: started when the Start Character is detected on the Serial Line.
Local Port	View and if desired, override the default Local Value values. ◆ Local port default values: Tunnel 1 is 10001 and Tunnel 2 is 10002. ◆ Blank the display field to restore to default random setting.
Host <Number> (Edit button)	Lists exhisting hosts, if any for viewing and editing. ◆ Click the **Edit** button beside a particular host to view the Address, Port and Protocol fields for this host. ◆ Make any changes, as desired in the Address, Port and Protocol fields and click **Submit** to save. ◆ Up to 2 hosts can be established. Additional hosts become available for editing/ submitting as a host is edited.
Connections	Select the type of connection. ◆ **Sequential**: connections for tunneling will begin from host 1 and proceed in sequence until a connection is accepted. ◆ **Simultaneous**: all hosts accepting connetions will be connected.
Reconnect Time	Enter the reconnection time, which specifies how long the xPico Wi-Fi device server will wait in seconds before trying to reconnect to the remote host after a failed attempt or closed connetion. Blank the display field to restore the default.
Flush Line	Select to enable or disable the flush line at the time a connection is established with the network. ◆ **Enabled:** buffered characters from the serial line will be discarded when a connection is established. ◆ **Disabled:** any characters received on the serial line will be buffered and sent after a connection is established.
Block Line	Select to enable or disable the block line, which is used for debugging purposes. ◆ **Enabled**: incoming characters from the serial line will not be forwarded to the network but will be buffered and will eventually flow off the serial line, if hardware or software flow control is configured. ◆ **Disabled**: incoming characters from the serial line are sent to the network. Any buffered characters are sent first. This is the “normal” setting.

Tunnel Connect Mode Settings	Description
Block Network	Select to enable or disable the block network, which is used for debugging purposes. ◆ **Enabled**: incoming characters from the network will not be forwarded to the serial line but will be buffered and eventually flow off the network side. ◆ **Disabled**: incoming characters from the network are sent on into the serial line. Any buffered characters are sent first. This is the "normal" setting.

To Configure Tunnel Connect Mode Settings

Using Web Manager

- To configure the Disconnect Mode for a specific tunnel, click **Tunnel** in the menu and select **Tunnel 1 -> Connect**.

Using CLI

- To enter the Tunnel command level: `config -> Tunnel <instance>`

Using XML

- Include in your file: `<configgroup name = "Tunnel Connect" instance = "1">`

Disconnect Mode

Specifies the optional conditions for disconnecting any Accept Mode connection that may be established. If any of these conditions are selected but do not occur and the network disconnects from the device, a Connect Mode connection will attempt to reconnect. However, if none of these conditions are selected, a closure from the network is taken as a disconnect.

Table 6-5 Tunnel Disconnect Mode Settings

Tunnel Disconnect Mode Settings	Description
Stop Character	Enter the Stop Character which when received on the Serial Line, disconnects the tunnel. The Stop Character may be designated as a single printable character or as a control character. Control characters may be input in any of the following forms: <control>J or 0xA (hexadercimal) or \10 (decimal). Disable the Stop Character by blanking the field to set it to <None>.
Modem Control	Select to enable or disable the disconnect when modem control pin is not asserted on the serial line.
Timeout	Enter the number of milliseconds a tunnel may be idle before disconnection. The value of zero disables the idle timeout.
Flush Line	Set whether to flush the Serial Line when the Tunnel is disconnected. Choices are: ◆ **Enabled** ◆ **Disabled** (default)

To Configure Tunnel Disconnect Mode Settings

Using Web Manager

- To configure the Disconnect Mode for a specific tunnel, click **Tunnel** in the menu and select **Tunnel 1 -> Disconnect**.

Using CLI

- To enter the Tunnel command level: `config -> Tunnel <instance>`

Using XML

- Include in your file: `<configgroup name = "Tunnel Disconnect" instance = "1">`

Statistics

Tunnel statistics contains data counters, error counters, connection time and connection information. Statistics are available at each individual connection and aggregated across all connections.

To View Tunnel Statistics

Using Web Manager

- To view statistics for a specific tunnel, click **Tunnel** in the menu and select the **Tunnel 1 -> Status**.

Using CLI

- To enter the Tunnel command level: `status -> Tunnel <instance>`

Using XML

- Look for the status header: `<statusgroup name = "line" instance = "1">`

Modem Emulation Settings

Note: *The following section describes the steps to view and configure Modem Emulation 1 settings; these steps also apply to Modem Emulation 2 settings.*

Table 6-6 Modem Emulation Settings

Modem Emulation Settings	Description
Listen Port	Specify a listen port to accept connections.
Echo Pluses	Select to enable or disable echo pluses to be echoed back during “pause +++ pause” escape sequence on the serial line.
Echo Commands	Select to enable or disable echo commands. If enabled, characters read on the serial line are echoed while the modem is in Modem Command Mode.

Modem Emulation Settings	Description
Verbose Response	Select to enable or disable verbose response. If enabled, modem response codes are sent out on the serial line.
Response Type	Select either Text or Numeric representation for the modem response codes sent out on the serial line.
Error Unknown Commands	Select to enable or disable error unknown commands. If enabled, ERROR is returned to the serial line for unrecognized AT commands.
Incoming Connection	Select **Automatic**, **Manual** or **Disabled** for the handling of incoming connections.
Connect String	Specify a customized string to be sent with the CONNECT modem response code to the serial line, if any.
Display Remote IP	Select to enable or disable display remote IP. If enabled, the incoming ring sent on the serial line is followed by the IP address of the caller.

Using Web Manager

- To configure the modem emulation for a specific tunnel, click **Modem Emulation** in the menu and select **Modem Emulation 1 -> Configuration**.
- To view the modem emulation status for a specific tunnel, click **Modem Emulation** in the menu and select **Modem Emulation 1 -> Status**.

Using the CLI

- To enter the Modem Emulation command level: config -> Modem Emulation <1>

Using XML

- Include in your file: `<configgroup name="Modem Emulation" instance="1">`

Table 6-7 Modem Emulation Commands and Descriptions

Command	Description
AT?	Help. Displays this table.
ATA	Answer incoming call request (if ATS0=2 or greater).
ATD	Connects to the configured Connect Mode address and port.
ATD	<address>:<port> Connects to the specified address and port.
ATD 0	Enters the Command Line Interface (CLI); exit returns to AT commands.
ATDP	Same as ATD.
ATDT	Same as ATD.
ATEn	Switches echo in command mode (n=0: off, n=1: on).
ATH	Disconnects the network session.
ATI	Displays modem information.
ATO	Switches to data mode if connection still exists. Reverse of '+++'.
ATQn	Quiet mode (n=0: enable results code, n=1: disable results code.)
ATS0=n	Accept connection. (n=0: no, n=1: auto, n=2+: via ATA command).

Command	Description
ATUn	Accept unknown commands. (n=0: off, n=1: on).
ATVn	Verbose mode (n=0: numeric result codes, n=1: text result codes.)
ATXn	Command does nothing and returns OK status.
ATZ	Restore active settings from defaults.
AT&F	Reset saved settings in NVR to factory defaults.
AT&V	Display current and saved settings.
AT&W	Save active settings to NVR.
AT&Z	Restore active settings from NVR.
A/	Repeat last command.
+++	Switches to command mode if entered from serial port during connection.

7: Configurable Pin Manager

The Configurable Pin Manager (CPM) is responsible for the assignment and control of the configurable pins (CPs) available on the xPico Wi-Fi embedded device server. There are eight configurable pins on the xPico Wi-Fi unit.

You must configure the CPs by making them part of a role. A CP role may consist of one or more CPs. This increases flexibility when incorporating the xPico Wi-Fi device into another system.

Note: *The blue text in the XML command strings of this chapter are to be replaced with a user-specified name.*

Configurable Pin Status

Each CP is associated with an external hardware pin. The Current Configuration table shows the sample settings for each CP.

Table 7-1 Current Configurable Pins

CP	Ref	Usage	Assert	Mode	Value	Roles	Active in Role
CP1	Pin 35	Input	High	Push-Pull	0	1	<available>
CP2	Pin 26	Input	High	Push-Pull	1	1	<available>
CP3	Pin 28	Input	High	Push-Pull	0	0	<available>
CP4	Pin 30	Input	High	Push-Pull	1	0	<available>
CP5	Pin 32	Input	High	Push-Pull	0	0	<available>
CP6	Pin 34	Input	High	Push-Pull	0	0	<available>
CP7	Pin 27	Input	High	Push-Pull	0	0	<available>
CP8	Pin 3	Input	High	Push-Pull	0	-0	<available>

Table 7-2 CP Status

CPM – CPs Status	Description
Ref	Indicates the pin number on the device which corresponds to this configurable pin.
Usage	Indicates whether this pin is set as Input, Output or Reserved (for a different use).
Assert	Indicates the polarity of the configurable pin as High or Low.
Mode	Indicates whether this pin is setup for push-pull or if it enables an internal weak pullup.
Value	Indicates the logical value of the configurable pin.
Roles	Indicates the number of configurable pin roles which refer to this pin.

CPM – CPs Status (continued)	Description
Active in Role	Indicates the current active role that uses this pin. If there is currently no role, <available> will display. Click a specific action as desired for the configurable pin: ◆ Usage Input ◆ Usage Output ◆ Usage Unused ◆ Assert High ◆ Assert Low ◆ Mode Push-Pull ◆ Mode Weak Pullup ◆ Value 0 ◆ Value 1

Note: *To modify a CP, all roles in which it is a member must be disabled.*

Note: *The changes to a CP configuration are not saved in FLASH. Instead, these CP settings are used when the CP is added to a CP Role. When the CP Role is saved, its CP settings are saved with it. Thus, a particular CP may be defined as "Input" in one role but as "Output" in another. Only one role containing any particular CP may be enabled at once.*

Roles

The CP Role settings allow for the management of CP roles. Roles are configurable, may be enabled or disabled and can be assigned or unassigned to a configurable pin. A role, based on its state, can trigger outside events. Only an enabled role can be a trigger.

xPico Wi-Fi roles available for assignment to a configurable pin include the following:

- Role AP Trigger
- Role Line 1 DSR
- Role Line 1 DTR
- Role Line 2 DSR
- Role Line 2 DTR
- Role Line 2 Flow.CTS
- Role Line 2 Flow.RTS
- Role SPI.CS
- Role SPI.INT
- Role SPI.MISO
- Role SPI.MOSI
- Role SPI.SCK

The items listed in the *Table 7-3* can be configured for each role.

Table 7-3 Role Configuration

CPM – Role Current Configuration	Description
CP	View or modify the number of the configurable pin assigned to this role. Enter 0 or blank the field to revert to <No CP Selected>.
State	View or modify whether the role is enabled or disabled for use.
Assert	View or modify the polarity of the cp role as High or Low.
Mode	Shows the number of CPs assigned to the role.

To Configure CPM Settings

Using Web Manager

- To view or configure a configurable pin, click **CPM** in the menu, select **CPs** then the **Detail** link to the right of a specific CP to configure.
- To configure a CPM role, click **CPM** in the menu, select **Roles > Configuration** and then the **Edit** link to the right of a specific role to configure.
- To view a CPM role status, click **CPM** in the menu, select **Roles > Status** and then the **Detail** link to the right of a specific role to view details.

Using the CLI

- To enter the CPM command level: config -> CPM

Using XML

- Include in your file: `<configgroup name="cpm">`
- Include in your file: `<statusgroup name= "CPM Roles">`
- Include in your file: `<statusgroup name= "CPM CPs">`

8: Services Settings

HTTP Settings

Hypertext Transfer Protocol (HTTP) is the transport protocol for communicating hypertext documents on the Internet. HTTP defines how messages are formatted and transmitted. It also defines the actions web servers and browsers should take in response to different commands. HTTP Authentication enables the requirement of usernames and passwords for device access.

Table 8-1 **HTTP Settings**

HTTP Settings	Description
State	Select to enable or disable the HTTP server: ◆ **Enabled** (default) ◆ **Disabled**
Port	Enter the port for the HTTP server to use. The default (80) will be restored when the field is cleared.
Inactivity Timeout	Enter the amount of time the HTTP server will hold power on after completing a request. This setting only applies if HTTP Server is enabled in Performance.
URI	Displays the root of the Uniform Resource Identifier (URI) to apply access control settings. ***Note:*** *The URI must begin with '/' to refer to the entire file system.*
Auth Type	Select the authentication type: ◆ **None**: no authentication is necessary. ◆ **Basic**: encodes passwords using Base64.
Users	Displays the username allowed to access the configured URI.

To Configure HTTP Settings and Access Control

Using Web Manager

- To configure HTTP settings, click **HTTP** in the menu and select **Configuration**.

Using CLI

- To enter the HTTP Server command level: `config -> HTTP Server`

Using XML

- Include in your file: `<configgroup name = "HTTP Server">`
- Include in your file: `<configgroup name = "HTTP Server Access Control" instance="1">`

To View HTTP Status

Using Web Manager

- To view HTTP status, click **HTTP** in the menu and select **Status**.

Using CLI

- To enter the HTTP Server command level: `status -> HTTP Server>`

Using XML

- Look for the status header: `<statusgroup name = "HTTP Server">`

9: Maintenance and Diagnostics Settings

File System Settings

The xPico Wi-Fi embedded device server uses a flash file system to store files. The file system can be formatted and compacted: formatting erases all files while preserving configuration, and compacting reclaims dirty space while preserving all files.

The file system also provides statistics and the ability to create, delete, and manipulate files and directories.

File System Statistics

Table 9-1 File System Statistics Settings

File System Commands	Description
Compact	Compact the **File System** to reclaim dirty flash storage while preserving any existing files and directories.
Format	Format the **File System** to erase all existing files and directories, while preserving configuration.

To View File System Statistics, Compact or Format the File System

Using Web Manager

- To view file system statistiscs, compact or format the file system, click **FIle System** in the menu.

Using CLI

- To enter the File System command level: `status -> File System`

Using XML

- Look for the status header: `<statusgroup name = "File System”>`

File Display

It is possible to view the list of existing files, and to view their contents.

To Display Files

Using Web Manager

- To view existing files and file contents, click **File System** in the menu and select **Browse**.

Using the CLI

- To enter the File System command level: `enable -> file system`

Using XML

- Not applicable.

File Manipulation

The xPico Wi-Fi embedded device server allows for files to be deleted, moved, renamed, and uploaded via HTTP. Directories can be created, deleted, moved, and renamed.

To Transfer or Modify File System Files

Using Web Manager

- To create a new file or directory, upload an existing file, copy or move a file, click **File System** in the menu and select **Browse**.

Using the CLI

- To enter the File System command level: `enable -> file system`

Using XML

- Not applicable.

Device Settings

The xPico Wi-Fi Device settings allow for rebooting the device, restoring factory defaults, and uploading new firmware.

Anytime you reboot the unit, this operation will take some time to complete. Please wait a minimum of 10-20 seconds after rebooting the unit before attempting to make any subsequent connections.

Device Management

Table 9-2 Device Management Settings

System Settings	Description
Save	Any cached configuration changes are committed, so they will apply after a reboot. Without saving, cached configuration changes are lost after a reboot.
Reboot (button)	Reboots the device. When rebooted, your browser should be refreshed and redirected to the main status page after 30 seconds. ***Note:*** *The redirect will not work as expected if the IP address of the devices change after reboot. After setting the configuration back to factory defaults, the device will automatically be rebooted. If Web Manager is access through SoftAP, your connection to SoftAP may be dropped when device reboots.*
Factory Defaults (button)	Restores the device to the original factory settings. All configuration will be lost. The xPico Wi-Fi automatically reboots upon setting back to the defaults.
Firmware Upload (button)	Device will reboot to the Over-The-Air (OTA) firmware upgrade application to continue the operation.

Note: *Go to Chapter 13: Updating Firmware for directions on uploading new firmware.*

To Save Configuration, Reboot, Restore Factory Defaults or Upload Firmware

Using Web Manager

- To access the area with options to reboot, restore to factory defaults, upload new firmware, click **Device** in the menu.

Using CLI

- To enter the Device command level: `status -> Device`

Using XML

- Look for the status header: `<statusgroup name = "Device”>`

Admin User

Table 9-3 Admin User Settings

System Settings	Description
Password	Enter a new password. Users will need to log in again after changing the password.

To Configure Admin User on the Device

Using Web Manager

- To change the password setting, click **Users** in the menu.

Using CLI

- To enter the Users command level: `config -> Users`

Using XML

- Look for the status header: `<configgroup name = "Users" instance=”admin”>`

Diagnostics Settings

The xPico Wi-Fi embedded device server has tools for diagnostics and statistics. Options allow for the viewing of hardware, IP sockets, threads, and buffer pools.

To View Hardware Status

Using WebManager

- To view hardware information, click **Diagnostics** in the menu and select **Hardware**.

Using CLI

- To enter the Diagnostics command level: `status -> Diagnostics`

Using XML

- Include in your file: `<statusgroup name="Diagnostic Hardware">`

To View IP Socket Status

Using WebManager

- To view IP Sockets information, click **Diagnostics** in the menu and select **IP Sockets**.

Using CLI

- To enter the IP Sockets command level: `status -> Diagnostics -> IP Sockets`

Using XML

- Include in your file: `<statusgroup name="Diagnostics IP Sockets">`

To View Buffer Pool Status

Using WebManager

- To view information for each Buffer Pool, click **Diagnostics** in the menu and select **Buffer Pools**.

Using CLI

- To enter the Buffer Pools command level: `status -> Diagnostics -> Buffer Pools`

Using XML

- Include in your file: `<statusgroup name="Diagnostic Buffer Pools"`

10: Advanced Settings

XML Import and XML Export

The xPico Wi-Fi embedded device server allows for the configuration of devices by using XML configuration records (XCRs). You can export an existing configuration for use on other xPico Wi-Fi devices or import a saved configuration file. XML import and export are only available through the CLI.

Note: *The xPico Wi-Fi module itself only supports serial TTL signaling on both Lines. If used with the evaluation board (see the xPico Embedded Device Server Evaluation Kit User Guide), then Line 2 may be routed through a serial-to-USB converter via jumper settings.*

To ensure optimal performance when configuring and managing the device using XML, it is required that serial port flow control is enabled. This maybe hardware or soft flow control. Lantronix recommends the use of hardware flow control to ensure the best throughput.

To Import or Export XML Configuration

1. Connect the xPico Wi-Fi embedded device server to a PC using:
   - A null modem cable for line 1.
   - A USB cable for line 2. The USB driver will automatically install into your PC.
2. Configure command line on line and select hardware or software flow control.

   Note: *If you are using line 2, select software flow control as hardware flow control is not supported.*
3. Open a terminal emulator from the PC, e.g., Tera Term version 4.58.
4. Select the Com port or USB serial port and set the serial settings, on the terminal emulator, to match the appropriate line on the device server.
5. When you see prompt '>' on the terminal emulator, type 'h' to view the single character commands available.

```
c>h
                  COMMAND LINE INTERFACE HELP

<tab>           fill in possible command
<enter>         run command as edited
*<enter>        show help on matching commands
?               list matching commands
<left arrow>    move cursor left
<right arrow>   move cursor right
<up arrow>      previous command
<down arrow>    later command
<backspace>     delete to left
<delete>        delete to left
<Paste XML>     import configuration

<control>                          <escape>
```

```
--------------------------------  --------------------------------
a  move cursor to begin of line    b        move cursor backward word
d  delete character under cursor   f        move cursor forward word
e  move cursor to end of line      [A       previous command
k  delete to end of line           [B       later command
l  redraw line                     [C       move cursor right
r  redraw line                     [D       move cursor left
u  delete to begin of line         <escape> delete word to left
w  delete word to left

>
```

6. Enter XML commands and utilize either `xcr dump` or `secret xcr dump` to dump xml configuration information.
7. Copy and paste the configuration text into notepad or some other basic text editor.
8. Remove all the spaces in the script within the text editor. This basic text is the exported XML configuration and is now available for copy-paste into any xPico Wi-Fi embedded device server.
9. Make any additional changes to the configuration text to modify the XML configuration.
10. Copy and paste <CR> all of the text into the terminal emulator connected to the desired xPico Wi-Fi embedded device server, to "import" the new configuration.

    Note: *Software flow control experiences overrun above 460800 baud.*

Performance Settings

Change settings pertaining to performance including application, maximum time powered down, wake-up pin power up, and time powered up.

Table 10-1 Performance Settings

Modem Emulation Settings	Description
Application	Select the performance application: ◆ Tunnel Accept ◆ Tunnel Connect ◆ Command Line ◆ HTTP Server Any application selected for performance may hold the power on longer or wake up sooner.
Maximum Time Powered Down	Indicates the maximum amount of time for the device to be powered down. After this time, the device wakes up.
WKUP Pin Power Up	Enable or disable WKUP pin power up. The device wakes up on the rising edge of WKUP, if enabled.
Time Powered Up	Indicates the amount of time for the device to be powered up. After this time, the device powers down.

To Configure Performance

Using Web Manager

- To modify performance settings, click **Performance** in the menu.

Using CLI

- To enter the Performance command level: `config -> Performance`

Using XML

- Include in your file: `<configgroup name = "Performance"`

11: Monitor

The Monitor feature can be used to query and capture desired information during an xPico Wi-Fi serial port to serial device connection.

Monitor Settings

Through the Monitor feature in Web Manager, you may configure the monitoring of a connected serial device through a sequence of five pages via Explorer, or go to a specific Configuration page to make specific changes. The device monitoring status can be viewed through the Status page.

Note: *The easiest way to view monitor status or modify monitor settings is through Web Manager, however you can also utilize the CLI and XML (see* *To Configure Monitor on page 59**).*

Explorer

Configure the monitoring of a connected serial device through a sequence of pages via Explorer.

Table 11-1 Monitor Explorer Settings

Explorer Settings	Description
Next/Prev (buttons)	Click the **Next** and **Prev** button to move between the five pages below, through which monitor settings are configured: ◆ **Step 1: Setup Initiation** ◆ **Step 2: Setup Commands** ◆ **Step 3: Define Filters** ◆ **Step 4: Pick Data** ◆ **Step 5: Confirm and submit changes**
Initial Delay	Set the initial delay time in milliseconds before the monitor starts processing the initialization message. This field appears in **Step 1: Setup Initiation**.
Message <Number> ***Note:*** *In subsequent screens (Commands/ Control and Poll) in Explorer or under Configuration, additional Message <Number> fields will become available to further filter and specify the information you wish to monitor.*	Click the **Edit** link to edit a specific message; this is where a command is entered. Four message fields will open to allow configuration of a specific command. When you begin entering information in these fields, additional **Message <Number>** options become available containing the four message fields which will also open upon clicking **Edit**. Complete the **Message <Number>** fields: ◆ **Command**: enter the command in binary format (printable characters or binary string) ◆ **End Character**: indicate as a single printable character or as a control character. Control characters may be input as `<control>J`, `0xA` (hexadecimal) or `\10` (decimal). ◆ **Length**: set the length of the response. Maximum reponse length is 2048 bytes. ◆ **Timeout**: set the timeout to receive response. Minimum timeout length is 100 milliseconds. Click **Submit** after making changes to get real time response displayed if you are utilizing Explorer.

Explorer Settings	Description
Rule <Number>	Click the **Edit** link to edit a specific rule in the **Step 2: Setup Commands** page. Two rule configuration fields will open for this rule. When you begin entering information in these fields, additional **Rule <Number>** options become available containing the two rule configuration fields which will also open upon clicking **Edit**. Complete the **Rule <Number>** fields: ◆ **Source**: indicate the input of the filter. For example, if the source of this filter is the second trunk of data created by filter 1, the source should be set to 1.2. A Source of 0 indicates the raw response. ◆ **Mode**: select filter mode (All, Delimiters or Binary) ◆ **Delimiter <Number> Binary String**: Enter the filter breaks input up to 8 trunks separated by binary string. Each trunk will not contain the delimiters. This field appears when Delimiter Mode is selected. ◆ **Start index**: set to indicate when delimiters filter start breaking input into trunks, if the Delimiter Mode is selected. ◆ **Offset**: set the size of the first trunik of data created by the binary filter, if selected. ◆ **Length**: set the size of the second trunk of data created by the binary filter, if selected. The third trunk of data created by the binary filter will contain the rest of the input.
Selector <Number>	Click the **Edit** link to edit a specific selector in **Step 4: Pick Data** page. Three selector configuration fields will open for this selector. When you begin entering information in these fields, additional **Selector <Number>** options become available containing the three selector configuration fields which will also open upon clicking **Edit**. Complete the **Selector <Number>** fields: ◆ **Name**: define the data name as it will display. ◆ **Response**: set the response instance source of data. Response instance corresopnds to poll or control message instance. ◆ **Reference**: select the output of the monitor filter. For instance, if data should select the second trunk of data created by filter 1, the reference must be set to 1.2. A Reference of 0 indicaets the raw response.
Display	Select the desired live response to view at any time while using Explorer, of the monitoring configuration being established. Filter rule options appear according to your progress establishing commands and rules. Changes in what is displayed can be useful during the configuration of monitor settings. ◆ Responses 1-4 ◆ Filter Rules 1-4 or All Filters
Data (checkbox)	Check the Data checkbox to enable the Display feature anytime using the Explorer. Uncheck checkbox to disable Display.

Configuration

Configure the monitoring of a connected serial device through specific configuration settings pages : Initialization, Control, Poll , Filter, and Data. Access the configuration options displayed in *Table 11-2* on the **Initialization** page. These configuration fields are the same ones in **Step 1: Setup Initiation** if utilizing Explorer.

Table 11-2 Monitor Initialization Settings

Initialization Settings	Description
Initial Delay	Set the initial delay time in milliseconds before the monitor starts processing the initialization message. This field also appears in **Step 1: Setup Initiation**.
Message <Number> ***Note:*** *In other pages (**Commands/Control** and **Poll**) in Explorer or under Configuration, additional **Message <Number>** fields will become available to further filter and specify the information you wish to monitor.*	Click the **Edit** link to edit a specific message; this is where a command is entered. Four message fields will open to allow configuration of a specific command. When you begin entering information in these fields, additional **Message <Number>** options become available containing the four message fields which will also open upon clicking **Edit**. Complete the **Message <Number>** fields: ◆ **Command**: enter the command in binary format (printable characters or binary string) ◆ **End Character**: indicate as a single printable character or as a control character. Control characters may be input as `<control>J`, `0xA` (hexadecimal) or `\10` (decimal). ◆ **Length**: set the length of the response. ◆ **Timeout**: set the timeout length. Minimum timeout length is 100 milliseconds. Click **Submit** after making changes to get real time response displayed if you are utilizing Explorer.

Access the configuration options displayed in *Table 11-3* on the **Control** page. These configuration fields are the same ones in **Step 2: Setup Commands** if utilizing Explorer.

Table 11-3 Monitor Control Settings

Control Settings	Description
Message <Number> ***Note:*** *In other pages (**Commands/Control** and **Poll**) in Explorer or under Configuration, additional **Message <Number>** fields will become available to further filter and specify the information you wish to monitor.*	Click the **Edit** link to edit a specific message; this is where a command is entered. Four message fields will open to allow configuration of a specific command. When you begin entering information in these fields, additional **Message <Number>** options become available containing the four message fields which will also open upon clicking **Edit**. Complete the **Message <Number>** fields: ◆ **Command**: enter the command in binary format (printable characters or binary string) ◆ **End Character**: indicate as a single printable character or as a control character. Control characters may be input as `<control>J`, `0xA (hexadecimal)` or `\10 (decimal)`. ◆ **Length**: set the length of the response. ◆ **Timeout**: set the timeout length. Minimum timeout length is 100 milliseconds. Click **Submit** after making changes to get real time response displayed if you are utilizing Explorer.

Access the configuration options displayed in *Table 11-4* on the **Poll** page. These configuration fields are the same ones in **Step 3: Define Filters** if utilizing Explorer.

Table 11-4 Monitor Poll Settings

Poll Settings	Description
Message <Number> ***Note:*** *In other pages (**Commands/Control** and **Poll**) in Explorer or under Configuration, additional **Message <Number>** fields will become available to further filter and specify the information you wish to monitor.*	Click the **Edit** link to edit a specific message; this is where a command is entered. Four message fields will open to allow configuration of a specific command. When you begin entering information in these fields, additional **Message <Number>** options become available containing the four message fields which will also open upon clicking **Edit**. Complete the **Message <Number>** fields: ◆ **Command**: enter the command in binary format (printable characters or binary string) ◆ **End Character**: indicate as a single printable character or as a control character. Control characters may be input as `<control>J`, `0xA` (hexadecimal) or `\10` (decimal). ◆ **Length**: set the length of the response. ◆ **Timeout**: set the timeout length. Minimum timeout length is 100 milliseconds. Click **Submit** after making changes to get real time response displayed if you are utilizing Explorer.
Delay	Set the initial delay time in milliseconds before the monitor starts processing the initialization message. This field appears in **Step 1: Setup Initiation**.

Access the configuration options displayed in *Table 11-5* on the **Filter** page. These configuration fields are the same ones in **Step 3: Define Filters** if utilizing Explorer.

Table 11-5 Monitor Filter Settings

Filter Settings	Description
Rule <Number>	Click the **Edit** link to edit a specific rule. Two rule configuration fields will open for this rule. When you begin entering information in these fields, additional **Rule <Number>** options become available containing the two rule configuration fields which will also open upon clicking **Edit**. Complete the **Rule <Number>** fields: ◆ **Source**: indicate the input of the filter. For example, if the source of this filter is the second trunk of data created by filter 1, the source should be set to 1.2. A Source of 0 indicates the raw response. ◆ **Mode**: select filter mode (All, Delimiters or Binary) ◆ **Delimiter <Number> Binary String**: Enter the filter breaks input up to 8 trunks separated by binary string. Each trunk will not contain the delimiters. This field appears when Delimiter Mode is selected. ◆ **Start index**: set to indicate when delimiters filter start breaking input into trunks, if the Delimiter Mode is selected. ◆ **Offset**: set the size of the first trunik of data created by the binary filter, if selected. ◆ **Length**: set the size of the second trunk of data created by the binary filter, if selected. The third trunk of data created by the binary filter will contain the rest of the input.

Access the configuration options displayed in *Table 11-6* on the Data page. These configuration fields are the same ones in **Step 4: Pick Data** if utilizing Explorer.

Table 11-6 Monitor Data Settings

Data Settings	Description
Selector <Number>	Click the **Edit** link to edit a specific selector. Three selector configuration fields will open for this selector. When you begin entering information in these fields, additional **Selector <Number>** options become available containing the three selector configuration fields which will also open upon clicking **Edit**. Complete the **Selector <Number>** fields: ◆ **Name**: define the data name as it will display. ◆ **Response**: set the response instance source of data. Response instance corresopnds to poll or control message instance. ◆ **Reference**: select the output of the monitor filter. For instance, if data should select the second trunk of data created by filter 1, the reference must be set to 1.2. A Reference of 0 indicaets the raw response.

To Configure Monitor

The easiest way to view monitor status or modify monitor settings is through Web Manager, however you can also utilize the CLI and XML.

Using Web Manager

- To view monitor status or modify monitor settings, go to **Monitor** on the menu.

Using CLI

- To enter the Monitor command level: `config -> Monitor`

Using XML

- Include in your file: `<configgroup name = "Monitor" instance = "1">`
- Include in your file: `<configgroup name = "Monitor Initialization" instance = "1">`
- Include in your file: `<configgroup name = "Monitor Control" instance = "1">`
- Include in your file: `<configgroup name = "Monitor Poll" instance = "1">`
- Include in your file: `<configgroup name = "Monitor Filter" instance = "1">`
- Include in your file: `<configgroup name = "Monitor Data" instance = "1">`

Example: Data Capture on a Serial Device

Connect the xPico Wi-Fi serial port to a serial device, then query and capture desired information periodically, presenting this information on a Web page.

Sample Configuration

- Connect to the Command Line Interface (CLI) on the EDS2100. The CLI has menu levels, so we will send commands to exit through multiple levels, knowing that an exit at the top level will just return us to the top level. Then we can enter the "enable" command level.
- Use a null modem cable to connect xPico Wi-Fi unit Line 1 to a Lantronix EDS2100 Line 1.
- Set both devices to 115200 bits per second, no parity, 8 data bits, 1 stop bit, hardware flow control.
- Set the first three message Commands to send "exit[0x0d]", the fourth "enable[0x0d]"

Initialization

Upon xPico Wi-Fi power-up, the state of the external serial device is not known. Monitor will send one or more messages to bring the serial device into a known state.

STEP 1 - STRATEGY

Explore your serial device and determine your strategy for bringing it to the desired starting state.

STEP 2 - CONNECTION

Connect your serial device to your xPico Wi-Fi unit.

STEP 3 - LINE SETTINGS

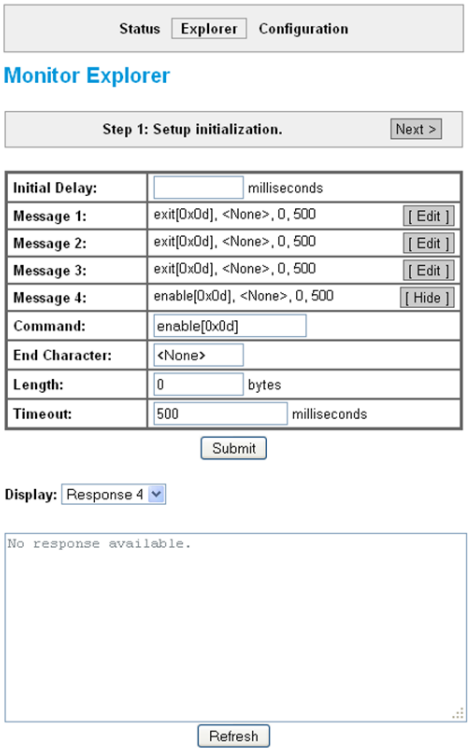
Set serial line speed, flow control, and character options on both devices so they are compatible. On xPico Wi-Fi unit, select "Monitor" under Line Protocol.

STEP 4 - MONITOR INITIALIZATION

Use Monitor Explorer or directly configure settings in Monitor Initialization Configuration. In *Figure 11-7 Monitor Initialization*the example configuration is typed into the Monitor Explorer web page.

Note: *Non-printable characters are placed in the Command within square brackets. The "Enter" key on your PC is an ASCII Carriage Return, code 0x0d.*

Figure 11-7 Monitor Initialization



Note: *After each message Command is sent, the Monitor may wait for a response. You may set the Timeout for each message. If the Timeout is too short, your device may become out of sync with Monitor. So make your timeout comfortably high, and then if applicable define an End Character or Length so it will move on without waiting further.*

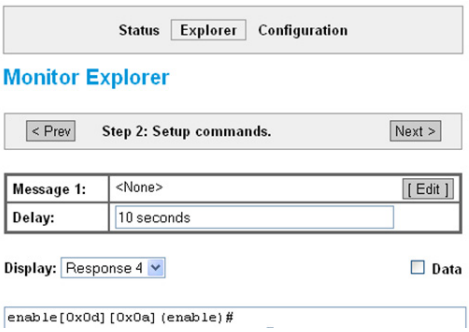
Polling

Periodically your xPico Wi-Fi will send commands to query information from your serial device.

STEP 1 - STRATEGY

Explore your serial device and determine your strategy for eliciting all of the desired data with the fewest message Commands.

Figure 11-8 Monitor Polling (1 of 2)



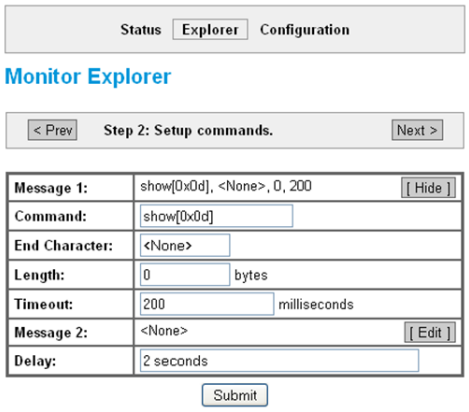
STEP 2 - SETUP

Use Monitor Explorer or directly configure settings in Monitor Poll Configuration. For each message Command, determine an appropriate Timeout and possibly shorten it via a Length and/or End Character.

STEP 3 - TEST

Testing is rapid and simplified using Monitor Explorer. You can see the serial device response right in your browser window.

Figure 11-9 Monitor Polling (2 of 2)



Sample Configuration

- Use a single "show" command to elicit the EDS2100 device status.
- In Monitor Poll Configuration, set Message 1 Command to "show[0x0d]".
- Testing with this, notice that the default Timeout of 100 milliseconds is too fast-we sometimes poll before all the data comes out. So we set Timeout to 200 milliseconds for stable operation.

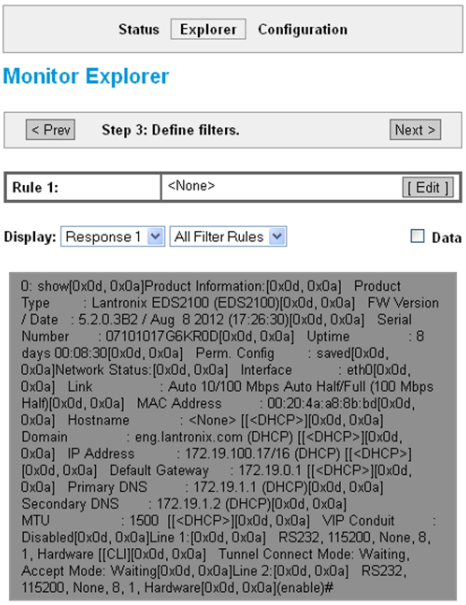
Note: *It is possible to poll with more than one message Command. They will be sent sequentially, and you will define distinct filtering and data mining steps for each.*

Filtering

The response to each poll will be sliced up according to your filter rules. The objective is to simply slice enough so you can subsequently point to the data fields you want to mine.

Note the raw data in the grey box above; it reflects what was received from the serial device. See "Uptime" in the top right region-that's our target for the example.

Figure 11-10 Monitor Filtering (1 of 2)



STEP 1 - STRATEGY

Carefully examine the form of the response you received from a particular poll. Look for cues in the response to locate your desired information. Consider if the form of the response might have variations depending on the serial device state.

STEP 2 - SETUP

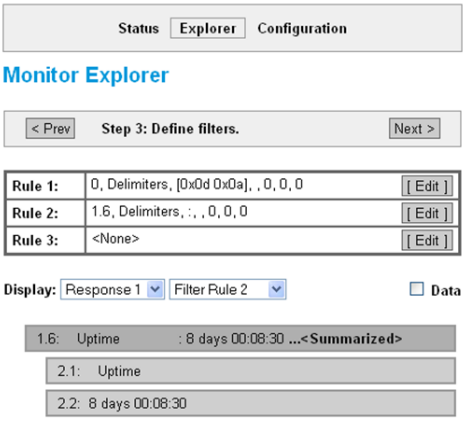
Use Monitor Explorer or directly configure settings in Monitor Filter Configuration. Rules are performed sequentially, but note that you can point each Rule to either the raw source (0) or a result of a previous rule (R.f). Each rule (R) slices the raw input into multiple fields (f), so with a dot between them (R.f) you are selecting a particular sliced result from a Rule.

STEP 3 - TEST

Testing is rapid and simplified using Monitor Explorer. You can see the response data sliced into pieces right in your browser windows.

Sample Configuration

Figure 11-11 Monitor Filtering (2 of 2)



- First slice the response into lines, point to the one containing Uptime, then slice between the caption and the time value.
- Setup as follows:
  - We could see the Carriage Return / Line Feed sequence in our raw source.
  - Rule 1 points to the raw source (Source 0), Mode = Delimiters, Delimiter 1 Binary String = "[0x0d 0x0a]".
  - We can see our Uptime is in the sixth field.
  - Rule 2 dices that field (Source 1.6) further, to split the caption from the value.
  - We see that a colon (:) separates the caption from the data, but the data also contains colons.
  - Rule 2 Mode - Delimiters, Delimiter 1 Binary String = " :" (that's a space followed by a colon). We use the space so it will match the transition from caption to value, but not match within the Uptime value itself.
- Testing with this, confirm that the desired data is contained in a single field.

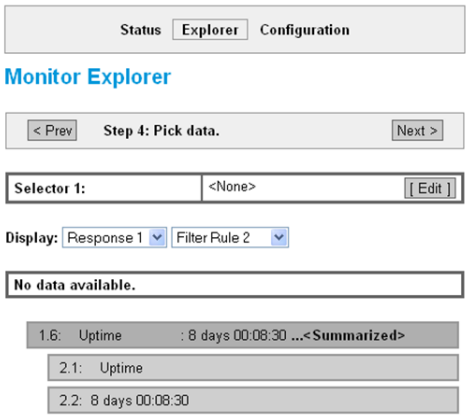
Note: *Some devices might use a variable number of lines to display status depending on the device state. If so, slicing first by lines will not consistently point to the desired data. Instead, consider a different strategy:*

- Rule 1 can use Mode = Delimiters, but set the Delimiter 1 Binary String = caption.
- Its field 2 contains all of the response following the caption.
- Use Rule 2 or more to further slice 1.2 (Rule 1 field 2) in order to separate the value from anything following the caption and from the rest of the response.

Data Mining

You have already sliced the raw data multiple ways using the Filter Steps. Now you will select the data to be mined.

Figure 11-12 Monitor Data Mining (1 of 2)



STEP 1 - STRATEGY

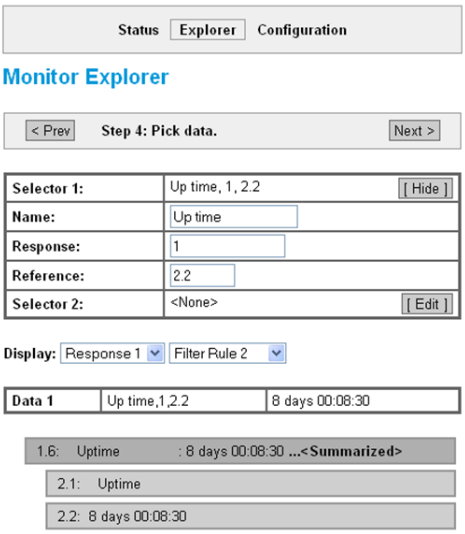
You can have multiple Poll messages, and different Filter Steps will generally apply to each, but some Filter Steps may be shared. Here is where you put it all together. The neat thing is that all the slicing of the raw data is virtual, so all of your Filter Rules overlay raw data from each response, but you need only care about some of them on a particular Poll message.

STEP 2 - SETUP

Use Monitor Explorer or directly configure settings in Monitor Data Configuration. Each Selector picks out a distinct data item you wish to subsequently present. The Selector Name will be presented as the caption for your data. Selector Response is a Message number; it selects the response from that Message. Selector Reference is a Rule number, dot, and a field number; it selects the desired data field.

Bottom line, you have placed a stake in the ground naming a result, identifying which poll response it comes from, and which field to pick up.

Figure 11-13 Monitor Data Mining (2 of 2)



STEP 3 - TEST

Testing is rapid and simplified using Monitor Explorer. You can see the selected field contents right in your browser window.

Sample Configuration

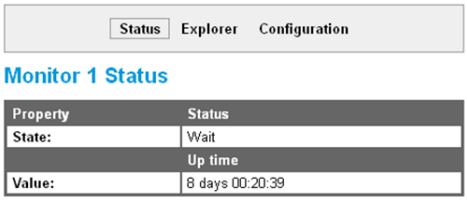
- We'll name our result "Up time". It goes in Monitor Data Configuration under "Name".
- We only used one Poll message, so "Response" is just "1".
- Our desired data is from Rule 2, field 2. So "Reference" is "2.2".

Presenting

STEP 1 - STRATEGY

Here you consider your options for sharing the data you have mined. For human users, a Web page presentation is simplest. For machine-to-machine communication, XML might be best. Command Line could be used for either.

Figure 11-14 Monitor Presenting



STEP 2 - SETUP

Automatically your data is available under status on the Web Manager, XML, and CLI.

Advanced Web customization can be done with HTML and JavaScript files dropped into the xPico Wi-Fi unit.

STEP 3 - TEST

With the Web Manager, view all of your data under Monitor Status.

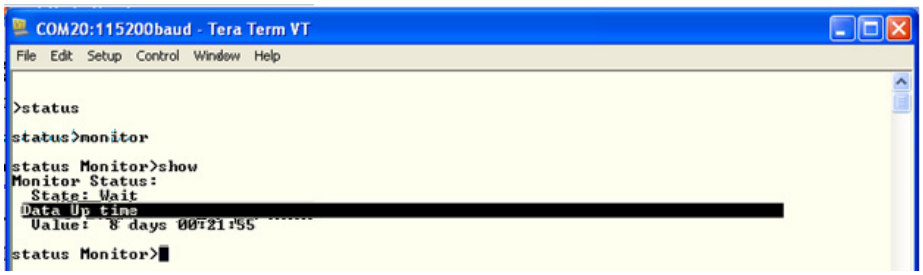
In the Command Line Interface (CLI), first type "status" to enter the status menu level, then type "monitor" for the Monitor menu level. From there, type "show" for the data.

In the XML status dump, find statusgroup name = "Monitor", then statusitem name = "data" instance = "<the name you gave your data>", and value contains the data received.

Sample Configuration

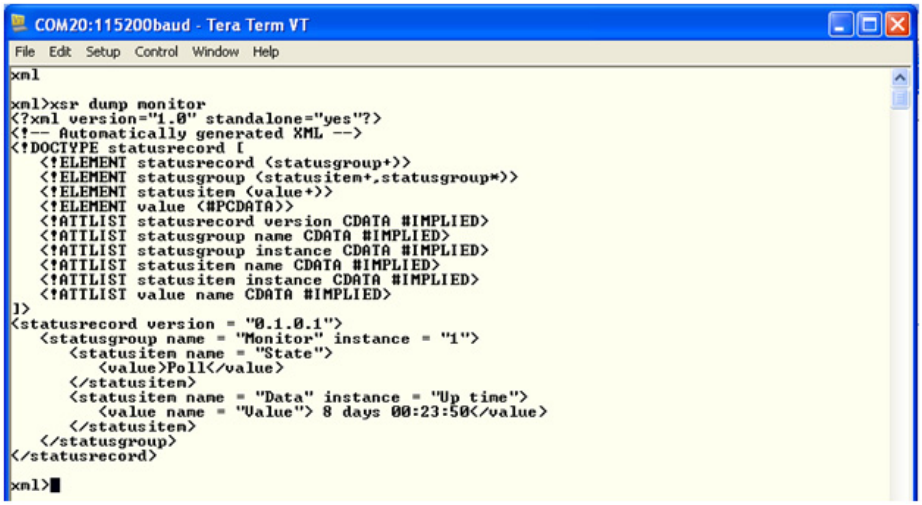
- We visit our device Web Manager, select the "Monitor" tab at the left of the display, the select "Status" at the top of the display. Our "Up time" and the present value appear there.

Figure 11-15 Monitor CLI Command Level



- Visiting the Command Line Interface, we type "status", then "monitor", then "show". We see "Up time" presented there.

Figure 11-16 Monitor XML Commands



- For XML we start at the root Command Line Interface, type "xml", then "xsr dump monitor". We see a statusitem name = "data", instance = "Up time", with value containing the present data.

DATA CAPTURE ON SPI

Connect xPico Wi-Fi SPI port to peripheral device, query and capture desired information periodically, present on Web page.

12: Branding the xPico Wi-Fi Unit

This chapter describes how to brand the Web Manager user interface of your xPico Wi-Fi embedded device server.

Web Manager Customization

Changing the Presentation

You can customize the Web Manager's appearance by modifying `index.html` and `style.css`. The style (fonts, colors, and spacing) of the Web Manager is controlled with `style.css` and the text and graphics are controlled with index.html.

The Web Manager files are hidden and are incorporated directly into the firmware image but may be overridden by placing the appropriate file in the appropriate directory within the xPico Wi-Fi file system.

Web Manager files can be overridden with the following procedure:

1. Either create a file from scratch, or edit a copy of the existing Lantronix file. To edit a copy of the original file, do the following:
   a. Obtain the file by entering the following path in a browser:

      `http://<hostname>/lantronix/resource/main/web_manager/web/<filename>`

   b. Then save the file (in the case of index.html, you may need to set the browser to view the page source).
   c. Modify the file as required.
2. Create a path in the file system (the entire path can be created in a single step via either the Web Manager or CLI). The path is the same as that for the hidden files, except for the top-level `/lantronix` directory:

   `/resource/main/web_manager/web/`
3. Upload your file into the directory in step 2.
4. Restart the browser to view the changes.

To go back to the default files in the firmware image, simply delete the overriding files in the file system (the directories can be left intact if so desired).

Path Format

As mentioned above, the root directory for hidden files built into the firmware is /lantronix. When overriding these hidden files by placing your own copies in the file system, the path is identical but for the `/lantronix` top directory. For example, the built-in hidden file `/lantronix/resource/main/web_manager/web/index.html` is overridden by the real file system file `/resource/main/web_manager/web/index.html`.

If you need to refer to an overridden file within your own web files, the path follows the same format, except the `/lantronix` top directory of the hidden file path is replaced by `/.overlay`. So, to refer to style.css from within index.html, the path in index.html is `/.overlay/resource/main/web_manager/web/index.html`. This format allows the system to look first for an overriding copy of the file before using the built-in copy.

Note: *This path schema is subject to change in the future.*

Other Overridable Files

In addition to index.html, and style.css, a few other presentation-related files can be overridden. The complete list is as follows:

- /resource/main/web_manager/web/index.html - Main file controlling text and graphics
- /resource/main/web_manager/web/style.css - Style sheet
- /resource/main/web_manager/web/img/bg.gif - Main background
- /resource/main/web_manager/web/img/company_logo.gif - Company logo in header container
- /resource/main/web_manager/web/img/favicon.ico - Shortcut icon
- /resource/main/web_manager/web/img/header_bg.gif - Head container background

13: Updating Firmware

Obtaining Firmware

Obtain the most up-to-date firmware and release notes for the unit from the Lantronix Web site (www.lantronix.com/support/downloads/) or by using anonymous FTP (ftp://ftp.lantronix.com/).

Loading New Firmware through Web Manager

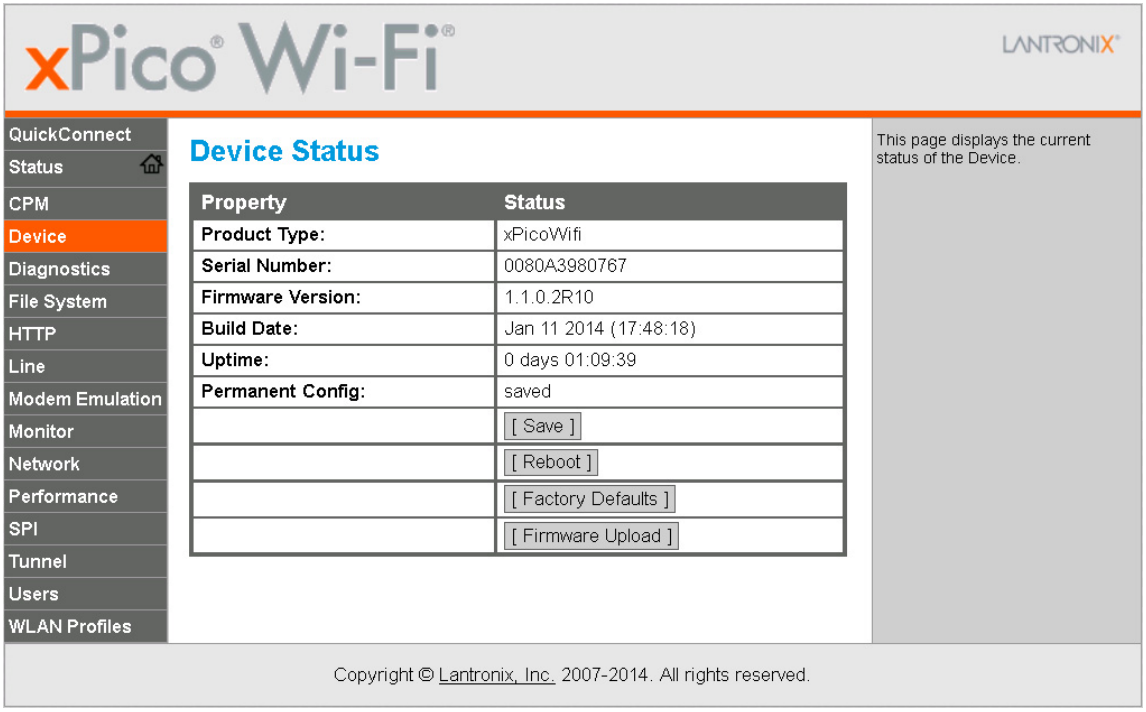
Upload the firmware using the device Web Manager **Device** page.

To upload new firmware:

1. Select **Device** in the menu bar. The **Device Status** page appears.

Note: *See Device Settings (on page 49) for options to restore factory defaults or reboot the debice.*

Figure 13-1 Uploading New Firmware



2. Click **Firmware Upload**.
3. Click **Okay** to confirm uploading a new firmware image. You will be redirected to the Firmware Upgrade page.
4. Click **Browse...** to browse to the firmware file.

5. Select the file and click **Open**.
6. Click **Upgrade** to install the firmware on the xPico Wi-Fi embedded device server.
7. Click **OK** in the confirmation pop-up which appears. The firmware will be installed and the device will automatically reboot afterwards.
8. Close and reopen the Web Manager internet browser to view the device's updated web pages.

Appendix A: Command Reference

The xPico Wi-Fi embedded device server supports three convenient configuration methods: Web Manager, Command Line Interface (CLI) and Extensible Markup Language (XML). This appendix describes how to configure the xPico Wi-Fi embedded device server using the Command Line Interface (CLI) and/or Extensible Markup Language (XML). CLI provides an interactive mode for accessing the device configuration and management interface. It is most suited for system and network administrators comfortable with using similar interfaces on Enterprise IT and Networking products. It is also helpful as a quick tool for access via the product's serial ports or console/ management ports. XML provides an extensible mode for software developers.

For more information about the Web Manager, see the *Chapter 3: Configuration Using Web Manager*.

Conventions

The table below lists and describes the conventions used in this book.

Convention	Description
Bold text	Default parameters.
Italic text	Required values for parameters
Brackets [ ]	Optional parameters.
Angle Brackets < >	Possible values for parameters.
Pipe |	Choice of parameters.
Warning	***Warning:*** ***Means that you are in a situation that could cause equipment damage or bodily injury. Before you work on any equipment, you must be aware of the hazards involved with electrical circuitry and familiar with standard practices for preventing accidents.***
Note	***Note:*** *Means take notice. Notes contain helpful suggestions, information, or references to material not covered in the publication.*
Caution	***Caution:*** ***Means you might do something that could result in faulty equipment operation, or loss of data.***
Screen Font (Courier New)	`CLI terminal sessions and examples of CLI input.`

XML Architecture and Device Control

XML is a fundamental building block for the future growth of Machine-to-Machine (M2M) networks. The xPico Wi-Fi embedded device server supports XML configuration records that make configuring the device server easy for users and administrators. XML configuration records are easy to edit with a standard text editor or an XML editor.

For a brief overview of XML, see *Configuration Using XML*. It provides rules on basic XML syntax, a guide to the specific XML tags used, and a guide to using XML configuration records.

Configuration Using Serial Port

Serial Command Mode

The serial port can be configured to operate in command mode permanently or to be triggered under specified conditions. See the `line <line> Level` command description for more information.

Boot to CLI

Regardless of the configured settings, the CLI can be accessed via Line 1 using fixed settings and the "back door" procedure. The original configured line settings will be restored once the user exits the "back door" CLI, unless any Line 1 settings are changed within the "back door" CLI.

To configure the Lantronix xPico Wi-Fi embedded device server locally using a serial port:

Note: *The xPico Wi-Fi embedded device server requires that flow control be used on the serial port to ensure the best performance when importing XML.*

1. Connect a terminal or a PC running a terminal emulation program to one of the xPico Wi-Fi embedded device server's serial ports.
2. Configure the terminal to the following settings:
   - 9600 baud
   - 8-bit
   - No parity
   - 1 stop bit
   - Flow control enabled

     Note: *Lantronix recommends using hardware flow control.*
3. Power off the device.
4. Get into the serial backdoor as follows:
   a. While asserting the defaults signal,
   b. Reset the device while sending X, Y, or Z characters.
   c. When the incoming characters are recognized, a prompt in the following form will be seen: `xPicoWifi <MAC ADDRESS>`

   Note: *It is important to release the defaults signal as soon as possible after the prompt is seen; continuing to hold it down may result in a reset to factory defaults.*

   OR

   a. While asserting the defaults signal,
   b. Reset the device while sending ! character until it is echoed back.
   c. Then release the defaults line, and enter xyz.

Navigating the CLI Hierarchy

The CLI is organized into a hierarchy of levels. Each level has a group of commands for a specific purpose. For example, to view diagnostic or device status, one would navigate to the `status` level where they could then navigate to `diagnostics` or `device`.

- To move to a different level—Enter the name of the level from within its parent level. For example, to enter the file system level, type `file system` at the enable prompt.
- To exit and return to one level higher—Type `exit` and press the **Enter** key.
- To view the current configuration, enter the config level by typing `config`.
- To view the list of commands available at the current level—Type the question mark `?`. Items within `< >` (e.g. `<string>`) are required parameters.
- To view the available commands and explanations—Type the asterisk (`*`).
- To view the list of commands available for a partial command—Type the partial command followed by the question mark "`?`". For example: `config>?` displays a list of all config commands at the config level.
- To view available commands and their explanations for a partial command—Type an asterisk (`*`). For example: `config Access Point>*` displays a list of all accesss point commands and descriptions at the config > access point level.
- To view SPI configurations, enter the config level by typing `config` at the root level, and then the SPI level by typing `SPI`.
- To view the tlog, type `tlog` or `t` at the root level.

Using Keyboard Shortcuts and CLI

One useful shortcut built into xPico Wi-Fi embedded device server is that the complete text of a command does not have to be entered to issue a command. Typing just enough characters to uniquely identify a command, then hitting enter, can be used as a short cut for a command. For example, at the enable level, "sh" can be used for the "show" command.

Tab Completion is also available using the **Tab** and **Enter** keys on the keyboard. Typing the first few characters of a command, then hitting the **Tab** key displays the first command that begins with those characters. Hitting the **Tab** key again displays the next command that begins with the original characters typed. You can press **Enter** to execute the command or you can backspace to edit any parameters.

The following key combinations are allowed when configuring the Pico Wi-Fi embedded device server using the CLI:

Table A-1 Keyboard Shortcuts

Key Combination	Description
Ctrl + a	Places cursor at the beginning of a line
Ctrl + b	Backspaces one character
Ctrl + d	Deletes one character
Ctrl + e	Places cursor at the end of the line
Ctrl + f	Moves cursor forward one character

Key Combination (continued)	Description
Ctrl + k	Deletes from the current position to the end of the line
Ctrl + l	Redraws the command line
Ctrl + n	Displays the next line in the history
Ctrl + p	Displays the previous line in the history
Ctrl + u	Deletes entire line and places cursor at start of prompt
Ctrl + w	Deletes one word back
Ctrl + z	Exits the current CLI level

Understanding the CLI Level Hierarchy

The CLI hierarchy is a series of levels. Arranging commands in a hierarchy of levels provides a way to organize and group similar commands, provide different levels of security, and reduce the complexity and number commands and options presented to a user at one time.

When you start a command line session, you begin at the root level. This level can be password protected and provides access to high level status, a few diagnostic commands, and the file system level. Further device information and configuration are accessed via the enable level.

The enable level can also be password protected and is the gateway to full configuration and management of the xPico Wi-Fi embedded device server. There are commands for gathering and effecting all elements of device status and configuration, as well as commands that take you to additional levels. For instance, tunnel specific status and configuration is found under the "tunnel" level, and network specific status and configuration commands are found under the "configuration" level.

Commands at the root level (see *Figure A-2 Root Level Commands* below) do not affect current configuration settings and are not displayed initially. If you type `?`, you will see the login sub-commands. These commands provide diagnostic and status information only.

Figure A-2 Root Level Commands

```
>?
config                                  file system
help                                    status
tlog                                    wlan scan [network-name]
xml                                     exit
```

Configuration Using XML

The xPico Wi-Fi embedded device server provides an Extensible Markup Language (XML) interface that you can use to configure xPico Wi-Fi embedded device servers. Every configuration setting, excluding XML import and export, that can be issued from the xPico Wi-Fi Web Manager and CLI can be specified using XML.

The XPico Wi-Fi embedded device server can import and export configuration settings as an XML document known as an XML Configuration Record (XCR). An XCR can be imported or exported via the CLI or the xPico Wi-Fi embedded device server filesystem. An XCR can contain many configuration settings or just a few. For example, it might change all of the configurable

parameters for a xPico Wi-Fi embedded device server, or it may only change the baud rate for a single serial line. Using XCRs is a straightforward and flexible way to manage the configuration of multiple XPico Wi-Fi embedded device servers.

Note: *For directions on exporting or importing XML, please refer to* *XML Import and XML Export*.

XML Configuration Record Document Type Definition

An XML document type definition (DTD) is a description of the structure and content of an XML document. It verifies that a document is valid. XCRs are exported using the DTD as shown in *Figure A-3 DTD for XCRs*.

Figure A-3 DTD for XCRs

```
<!DOCTYPE configrecord [
<!ELEMENT configrecord (configgroup+)>
<!ELEMENT configgroup (configitem+,configgroup*)>
<!ELEMENT configitem (value+)>
<!ELEMENT value (#PCDATA)>
<!ATTLIST configrecord version CDATA #IMPLIED>
<!ATTLIST configgroup name CDATA #IMPLIED>
<!ATTLIST configgroup instance CDATA #IMPLIED>
<!ATTLIST configitem name CDATA #IMPLIED>
<!ATTLIST value name CDATA #IMPLIED>
]>
```

The xPico Wi-Fi DTD rules state the following:

- The XML document element is a `<configrecord>` element. This is the root element.
- A `<configrecord>` must have one or more `<configgroup>` elements and can have a version attribute.
- A `<configgroup>` must have one or more `<configitem>` elements and can have name and instance attributes.
- A `<configitem>` element must have one or more <value> elements and can have a name attribute.
- A `<value>` element can have only data and can have a name attribute.
- The name attribute identifies a group, item, or value. It is always a quoted string.
- The instance attribute identifies the specific option, like the serial port number. The "instance" attribute is always a quoted string.

Note:

- *The name for each <configgroup> (specified with the name attribute) is the group name listed in the Web Manager XCR groups or with the "xcr list" CLI command. See the xPico Wi-Fi Embedded Device Server User Guide for more information about the XCR groups.*

- *An empty or missing <value> element in each present <configgroup> clears the setting to its default.*

Quick Tour of XML Syntax

Declaration

The first line, `<?xml version="1.0" standalone="yes"?>`, is called the XML declaration. It is required and indicates the XML version in use (normally version 1.0). The remainder of the file consists of nested XML elements, some of which have attributes and content.

Element Start and End Tags

An element typically consists of two tags: start tag and an end tag that surrounds text and other elements (element content). The start tag consists of a name surrounded by angle brackets, for example `<configrecord>`. The end tag consists of the same name surrounded by angle brackets, but with a forward slash preceding the name, for example `</configrecord>`. The element content can also contain other "child" elements.

Element Attributes

The XML element attributes that are name-value pairs included in the start tag after the element name. The values must always be quoted, using single or double quotes. Each attribute name should appear only once in an element.

Figure A-4 shows an XML example which consists of a declaration (first line), nested elements with attributes and content.

Figure A-4 XML Example

```
<configgroup name = "HTTP Server">
     <configitem name = "State">
        <value>Enabled</value>
     </configitem>
     <configitem name = "Port">
        <value>80</value>
     </configitem>
     <configitem name = "Inactivity Timeout">
        <value>5 minutes</value>
     </configitem>
     <configitem name = "Access Control" instance = "1">
        <value name = "URI">/</value>
        <value name = "AuthType">Basic</value>
        <value name = "Users">admin</value>
     </configitem>
  </configgroup>
```

The xPico Wi-Fi embedded device server uses the attributes in the following subsections to label the group configuration settings.

Record, Group, Item, and Value Tags

A <configgroup> is a logical grouping of configuration parameters and must contain one or more <configitem> elements. It must have a name attribute and may have an instance attribute.

A <configitem> is a specific grouping of configuration parameters relevant to its parent group. An item takes the name attribute and must contain one or more value elements. For example, the line group might have parameters such as baud rate, data bits, and parity.

A value may specify the value of a configuration parameter. It may contain the name attribute. In this example, a value of 9600 might be specified for baud rate; 7 may be specified for data bits, and even may be specified for parity

A name attribute identifies the group, item, or value. It is always quoted (as are all XML attributes). For example,a group that contains serial port parameters has the name "line"

An instance attribute identifies which of several instances is being addressed. It is always quoted. For example,the serial port name (in the line configgroup) has the instance "1" to indicate serial port 1 or "2" to specify serial port 2

The following figures show examples of XML configuration records and the use of the <configrecord>, <configgroup>, <configitem>, and <value> XML elements.

Figure A-5 XML Example

```
<configrecord version = "0.1.0.1">
   <configgroup name = "Access Point" instance = "ap0">
      <configitem name = "SSID">
         <value>XpicoWiFi_98010B</value>
      </configitem>
      <configitem name = "Channel">
         <value>1</value>
      </configitem>
      <configitem name = "Suite">
         <value>WPA2</value>
      </configitem>
      <configitem name = "Encryption">
         <value>CCMP</value>
      </configitem>
      <configitem name = "Passphrase">
         <value>&lt;Configured&gt;</value>
      </configitem>
      <configitem name = "Mode">
         <value>Always Up</value>
      </configitem>
   </configgroup>
```

XML for xPicoWi-Fi Embedded Device Server

configgroup Access Point

These settings pertain to the **Access Point** in the device. **Changes will take effect after reboot.**

configitem SSID

value

The default value of **SSID** is XpicoWiFi_hhhhhh, where hhhhhh are the last 6 hex digits from the BSSID.

Blank the value to restore the default.

SSID may contain up to 32 characters.

configitem Channel

value

No help available.

configitem Suite

value

Suite may be "None", "WPA" or "WPA2".

configitem Encryption

value

Encryption may contain any combination of "CCMP" or "TKIP".

configitem Passphrase

value

Passphrase may contain up to 63 characters.

The value is HIDDEN.

configitem Mode

value

Mode may be "Always Up" or "Triggered".

configitem Uptime

value

Uptime has units of seconds.

configgroup CPM

These settings pertain to the Configurable Pin Manager (**CPM**). Changes take effect immediately.

configitem Role

value Instance

Instance may contain up to 32 characters.

value CP

This is the number of the Configurable Pin (**CP**) assigned to the role.

Enter blank or 0 to revert to <No CP Selected>.

Blank the value for "<No CP Selected>".

value State

The **Enabled State** allows the application to use the designated Configurable Pin.

Note that some Roles (those containing a ".") are bundled into a group. Enabling / Disabling any one of them also Enables / Disables the rest of the Roles in the same Group.

State may be "Enabled" or "Disabled".

value Assert

Assert reflects the logical polarity of this Configurable Pin.

High means that a logical "1" corresponds to a voltage high condition on the pin.

Low means that a logical "1" corresponds to a voltage low condition on the pin.

Assert may be "High" or "Low".

value Mode

Mode indicates if this Configurable Pin is set up for push-pull or if it enables an internal weak pullup.

5-Volt tolerance: In order to sustain a voltage higher than VDD+0.3, the Mode must be set to Push-Pull.

Mode may be "Push-Pull" or "Weak Pullup".

configgroup HTTP Server

These settings pertain to the **HTTP Server**. **Changes will take effect after reboot.**

configitem State

value

Enable the **State** to allow the HTTP Server to operate.

Disable the **State** to prevent HTTP from operating on any port.

State may be "Enabled" or "Disabled".

configitem Port

value

The **Port** can be overridden. Blank the display to restore the default.

Zero the value for "<None>".

configitem Inactivity Timeout

value

The **Inactivity Timeout** applies only if the Application "HTTP Server" is enabled in Performance.

The HTTP Server will hold power on this long after it completes a request.

Inactivity Timeout has units of seconds.

configitem Access Control

value URI

The **URI** must begin with / to refer to the file system.

URI may contain up to 255 characters.

value AuthType

The different **AuthType** values offer various levels of security. From the least to most secure:

None
no authentication necessary
Basic
encodes passwords using Base64

There is no real reason to create an authentication directive using **None** unless you want to override a parent directive that uses some other **AuthType**.

AuthType may be "None" or "Basic".

value Users

Users may contain up to 54 characters.

configgroup Interface

These settings pertain to the **Network Interface** on the device. To see the effect of these selections after a reboot, view the corresponding **Status**. **Changes will take effect after reboot.**

When an Access Point is enabled, **DHCP Server** will assign IP addresses to the access point's clients. DHCP Server manages up to 4 client IP addresses (only 3 if wlan0 is enabled). The first IP Address will be the Access Point's IP Address plus one. For example, if the Access Point's IP Address is 192.168.0.1, the client addresses will range from 192.168.0.2 to 192.168.0.5.

configitem State

value

Enable the **State** to allow the Interface to operate.

State may be "Enabled" or "Disabled".

configitem DHCP Client

value

If **DHCP Client** is enabled, any configured IP Address, or Default Gateway will be ignored. DHCP Client will auto-discover and eclipse those configuration items. Hostname is sent to the remote DHCP Server and may figure into the address assignment.

When DHCP Client fails to discover an IP Address, a new address will automatically be generated using **AutoIP**. This address will be within the 169.254.x.x space.

This setting is not applicable to the Access Point.

DHCP Client may be "Enabled" or "Disabled".

configitem IP Address

value

IP Address may be entered alone, in CIDR form, or with an explicit mask:
192.168.1.1 (default mask)
192.168.1.1/24 (CIDR)
192.168.1.1 255.255.255.0 (explicit mask)

The IP Address will be displayed always in CIDR, the canonical form.

IP Address may contain up to 31 characters.

configitem Default Gateway

value

The **Default Gateway** is used only if DHCP Client is disabled, and provides the IP Address of the router.

This setting is not applicable to the Access Point.

Default Gateway may contain up to 15 characters.

configitem Hostname

value

Hostname must begin with a letter or number, continue with letter, number, or hyphen, and must end with a letter or number.

If **DHCP Client** is enabled, the Hostname is sent to the remote DHCP Server and may figure into the address assignment.

This setting is not applicable to the Access Point.

Hostname may contain up to 63 characters.

configitem Primary DNS

value

The **Primary DNS** is the first choice when performing a Domain Name lookup.

This setting is not applicable to the Access Point.

Primary DNS may contain up to 15 characters.

configitem Secondary DNS

value

The **Secondary DNS** is the second choice when performing a Domain Name lookup.

This setting is not applicable to the Access Point.

Secondary DNS may contain up to 15 characters.

configgroup Line

These settings pertain to the Serial **Line**. Changes take effect immediately.

configitem Name

value

The **Name** is for display purposes only.

Name may contain up to 25 characters.

configitem State

value

Enable the **State** to allow the Serial Line to operate.

State may be "Enabled" or "Disabled".

configitem Protocol

value

Protocol selects the application to connect to the Line:

None selects no application to connect to the Line.

Tunnel sets up the Line to work with the Tunnel application. See the Tunnel configuration options for details.

Trouble Log sets up an output-only message log on the device. Severity codes in the log are:
P Emergency
A Alert
C Critical
E Error
W Warning
N Notice
I Informational
D Debug

Command Line sets up a user interface containing commands to show device status and to change configuration. Simply paste in **XML** configuration to apply its settings to the device.

Protocol may be "Command Line", "Modem Emulation", "Monitor", "None", "Trouble Log" or "Tunnel".

configitem Baud Rate

value

When specifying a **Custom** baud rate in the Web Manager, select '`Custom`' from the drop down list and then enter the desired rate in the text box.

Baud Rate has units of bits per second.

configitem Parity

value

Parity may be "None", "Even" or "Odd".

configitem Data Bits

value

Data Bits may be "7" or "8".

configitem Stop Bits

value

Stop Bits may be "1" or "2".

configitem Flow Control

value

Flow Control may be "None", "Hardware" or "Software".

configitem Xon Char

value

When specifying **Xon Char**, prefix decimal with \ or prefix hexadecimal with 0x or prefix a single control character with <control>. These are used when **Flow Control** is set to Software.

Xon Char may contain one character, where <control>J, for example, counts as one.

configitem Xoff Char

value

When specifying **Xoff Char**, prefix decimal with \ or prefix hexadecimal with 0x or prefix a single control character with <control>. These are used when **Flow Control** is set to Software.

Xoff Char may contain one character, where <control>J, for example, counts as one.

configitem Gap Timer

value

The driver forwards received serial bytes after the **Gap Timer** delay from the last character received. By default, the delay is four character periods at the current baud rate (minimum 1 ms).

Gap Timer has units of milliseconds.

Blank the value for "<Four Character Periods>".

configitem Threshold

value

The driver will forward received characters after **Threshold** bytes have been received.

Threshold has units of bytes.

configgroup Performance

These settings pertain to **Performance**. Changes take effect immediately.

The device wakes up either on the rising edge of **WKUP**, if enabled, or after being down **Maximum Time Powered Down**.

The device powers down after **Time Powered Up**.

However, if any **Application** is selected, the application may hold power on longer or wake up sooner.

configitem Application

value Instance

Instance matches the name of a registered application.

Instance may contain up to 32 characters.

value State

Enable the **State** to allow the named Application to hold power on.

State may be "Enabled" or "Disabled".

configitem Maximum Time Powered Down

value

Maximum Time Powered Down has units of seconds.

Blank the value for "<Infinite>".

configitem WKUP Pin Power Up

value

WKUP Pin Power Up may be "Enabled" or "Disabled".

configitem Time Powered Up

value

Time Powered Up has units of seconds.

Blank the value for "<Infinite>".

configgroup SPI

These settings pertain to the **Serial Peripheral Interface (SPI)** Bus Master device. Changes take effect immediately.

configitem Name

value

The **Name** is for display purposes only.

Name may contain up to 25 characters.

configitem State

value

State selects the operating state of the SPI:

Enabled enables the SPI.

Disabled disables the SPI.

State may be "Enabled" or "Disabled".

configitem Protocol

value

Protocol selects the application to connect to the SPI:

None selects no application to connect to the SPI.

Monitor selects the Monitor application to connect to the SPI.

Protocol may be "None" or "Monitor".

configitem Target Speed

value

Target Speed selects the target clock speed of the SPI.

The **Target Speed** may be lowered to the closest **Operating Speed** capability of the device. If so, a warning will be noted.

0 or clearing the selection selects the minimum speed.

Target Speed has units of Hz.

Blank the value for "<Minimum>".

configitem Idle Clock Level

value

Idle Clock Level, also known as Clock Polarity or CPOL, selects the level of the clock when idle:

Low means the idle clock is at a low level. This is equivalent to CPOL=0.

High means the idle clock is at a high level. This is equivalent to CPOL=1.

Idle Clock Level may be "Low" or "High".

configitem Clock Edge

value

Clock Edge, also known as Clock Phase or CPHA, selects the clock edge for latching data:

First means each bit is latched on the first edge of the clock. This is equivalent to CPHA=0. When **Idle Clock Level** is **Low**, data is latched on the rising edge. When **Idle Clock Level** is **High**, data is latched on the falling edge.

Second means each bit is latched on the second edge of the clock. This is equivalent to CPHA=1. When **Idle Clock Level** is **Low**, data is latched on the falling edge. When **Idle Clock Level** is **High**, data is latched on the rising edge.

Clock Edge may be "First" or "Second".

configitem Bits Per Word

value

Bits Per Word selects the number of bits per word of transfer.

Bits Per Word may be "8" or "16".

configitem First Transfer

value

First Transfer selects the first transfer bit of each word.

First Transfer may be "Most Significant Bit" or "Least Significant Bit".

configgroup Users

These settings pertain to **Users** on the device.

configitem Instance

value

Instance may contain up to 16 characters.

configitem Password

value

Password may contain up to 32 characters.

The value is HIDDEN.

configgroup WLAN Profile

These settings pertain to a WLAN Profile on the device.

In the **Security** section, choice of **Suite**, **Key Type** and **Authentication** affect the makeup of other configurables in that section.

In the **Advanced** section, if **Power Management** is enabled, specify the **Power Management Interval**.

Use the **Apply** button to try out settings on the WLAN without saving them to Flash. If the settings do not work, when you reboot the device, it will still have the original settings.

Use the **Submit** button to both update the WLAN settings and save them to Flash.

If the device is connecting to an acess point on a different wireless channel, current connection to the soft AP interface of the device may be dropped due to the switch of channel. Reconnect to the soft AP interface in order to continue access to the device.

configitem Instance

value

Instance may contain up to 35 characters.

configitem Basic

value Network Name

Network Name may contain up to 32 characters.

value State

State may be "Enabled" or "Disabled".

configitem Security

value Suite

Suite may be "None", "WEP", "WPA" or "WPA2".

value WEP Key Size

Key Size may be "40" or "104".

value WEP TX Key Index

TX Key Index may be "1", "2", "3" or "4".

value WEP Key Key

Key may contain up to 13 bytes.

The value is HIDDEN.

value WPAx Key Type

Key Type may be "Passphrase" or "Hex".

value WPAx Passphrase

Passphrase may contain up to 63 characters.

The value is HIDDEN.

value WPAx Key

Key may contain up to 32 bytes.

The value is HIDDEN.

value WPAx Encryption

Encryption may contain any combination of "CCMP" or "TKIP".

configitem Advanced

value TX Power Maximum

TX Power Maximum has units of dBm.

value Power Management

Power Management may be "Enabled" or "Disabled".

value Power Management Interval

Power Management Interval has units of beacons (100 ms each).

configgroup XML Import Control

No help available.

configitem Restore Factory Configuration

value

Restore Factory Configuration may be "Enabled" or "Disabled".

configitem Reboot

value

Reboot may be "Enabled" or "Disabled".

configitem Missing Values

value

Missing Values may be "Unchanged" or "Set to Default".

configitem Delete WLAN Profiles

value

Delete WLAN Profiles may be "Enabled" or "Disabled".

configitem WLAN Profile delete

value name

name may contain up to 35 characters.

configgroup Modem Emulation

Connections can be initiated and accepted using **Modem** "AT" commands incoming from the Serial Line.

configitem Listen Port

value

Specify a **Listen Port** to accept connections on.

Blank the value for "<None>".

configitem Echo Pluses

value

With **Echo Pluses** enabled, pluses will be echoed back during a "pause +++ pause" escape sequence on the Serial Line.

Echo Pluses may be "Enabled" or "Disabled".

configitem Echo Commands

value

With **Echo Commands** enabled (ATE1), characters read on the Serial Line will be echoed while the Line is in Modem Command Mode.

Echo Commands may be "Enabled" or "Disabled".

configitem Verbose Response

value

With **Verbose Reponse** enabled (ATQ0), Modem Response Codes are sent out on the Serial Line.

Verbose Response may be "Enabled" or "Disabled".

configitem Response Type

value

Response Type selects either Text (ATV1) or Numeric (ATV0) representation for the Modem Response Codes sent out on the Serial Line.

Response Type may be "Text" or "Numeric".

configitem Error Unknown Commands

value

With **Error Unknown Commands** enabled (ATU0), ERROR is returned on the Serial Line for unrecognized AT commands. Otherwise (ATU1) OK is returned for unrecognized AT commands.

Error Unknown Commands may be "Enabled" or "Disabled".

configitem Incoming Connection

value

Incoming Connection requests may be disabled (ATS0=0), answered automatically (ATS0=1), or answered manually via the ATA command after an incoming RING (ATS0=2 or higher).

Incoming Connection may be "Disabled", "Automatic" or "Manual".

configitem Connect String

value

The **Connect String** is a customized string that is sent to the Serial Line with the CONNECT Modem Response Code.

Connect String may contain up to 30 characters.

configitem Display Remote IP

value

With **Display Remote IP** enabled, the incoming RING sent on the Serial Line is followed by the IP address of the caller.

Display Remote IP may be "Enabled" or "Disabled".

configgroup Monitor Initialization

These settings pertain to **Monitor Initialization** in the device.

Monitor will process any initialization message before it starts polling or process any control message. Response captured during initialization will be overwritten by any poll or control response.

configitem Initial Delay

value

Sets **Initial Delay** waited before monitor start processing any initialization message.

Initial Delay has units of milliseconds.

configitem Message

value Command

Sets the **Command** in binary format.

Binary format takes printable characters (e.g. 'abc' for characters 'a', 'b' and 'c') or binary string (e.g. [0xa, 0xd] for line feed and carriage return).

Command may contain up to 16 bytes.

value End Character

Sets the **End Character** to indicate end of response.

Response is ended by any configured **End Character**, **Length** OR **Timeout**.

The **End Character** may be designated as a single printable character or as a control character.

Control characters may be input in any of the following forms:

<control>J

0xA (hexadecimal)

\10 (decimal)

End Character may contain one character, where <control>J, for example, counts as one.

value Length

Sets the **Length** of response.

Response is ended by any configured **End Character**, **Length** OR **Timeout**.

Length has units of bytes.

value Timeout

Sets the **Timeout** to receive response. Minimum timeout is 100 milliseconds.

Response is ended by any configured **End Character**, **Length** OR **Timeout**.

Timeout has units of milliseconds.

Blank the value for "<Minimum>".

configgroup Monitor Control

These settings pertain to **Monitor Control** in the device.

Control Message will be processed after receiving status action **Send**. Response will overwrite any response captured during initialization or poll. Response must be read before sending another status action **Send** or buffer will be reset.

configitem Message

value Command

Sets the **Command** in binary format.

Binary format takes printable characters (e.g. 'abc' for characters 'a', 'b' and 'c') or binary string (e.g. [0xa, 0xd] for line feed and carriage return).

Command may contain up to 16 bytes.

value End Character

Sets the **End Character** to indicate end of response.

Response is ended by any configured **End Character**, **Length** OR **Timeout**.

The **End Character** may be designated as a single printable character or as a control character.

Control characters may be input in any of the following forms:

<control>J

0xA (hexadecimal)

\10 (decimal)

End Character may contain one character, where <control>J, for example, counts as one.

value Length

Sets the **Length** of response.

Response is ended by any configured **End Character**, **Length** OR **Timeout**.

Length has units of bytes.

value Timeout

Sets the **Timeout** to receive response. Minimum timeout is 100 milliseconds.

Response is ended by any configured **End Character**, **Length** OR **Timeout**.

Timeout has units of milliseconds.

Blank the value for "<Minimum>".

configgroup Monitor Poll

These settings pertain to **Monitor Poll** in the device.

Poll Message will be processed periodically. Response will overwrite any response captured during initialization or poll.

configitem Message

value Command

Sets the **Command** in binary format.

Binary format takes printable characters (e.g. 'abc' for characters 'a', 'b' and 'c') or binary string (e.g. [0xa, 0xd] for line feed and carriage return).

Command may contain up to 16 bytes.

value End Character

Sets the **End Character** to indicate end of response.

Response is ended by any configured **End Character**, **Length** OR **Timeout**.

The **End Character** may be designated as a single printable character or as a control character.

Control characters may be input in any of the following forms:

<control>J

0xA (hexadecimal)

\10 (decimal)

End Character may contain one character, where <control>J, for example, counts as one.

value Length

Sets the **Length** of response.

Response is ended by any configured **End Character**, **Length** OR **Timeout**.

Length has units of bytes.

value Timeout

Sets the **Timeout** to receive response. Minimum timeout is 100 milliseconds.

Response is ended by any configured **End Character**, **Length** OR **Timeout**.

Timeout has units of milliseconds.

Blank the value for "<Minimum>".

configitem Delay

value

Sets **Delay** waited before monitor starts processing all poll messages again. 0 means poll messages are sent

only once.

Delay has units of seconds.

configgroup Monitor Filter

These settings pertain to **Monitor Filter** in the device.

Filter settings will be applied to all received response. Filter results can be used to feed another filter or use as Data Reference.

configitem Rule

value Source

Sets the **Source** in dot number format.

Source defines the input of a filter. E.g. If the source of this Filter is the second trunk of data created by filter 1, **Source** must be set to "1.2". A **Source** of "0" indicates the raw response.

Dot number format could be "0" or two numbers separated by a dot (e.g. "1.2").

Source may contain up to 6 characters.

value Mode

Sets filter **Mode**.

All makes filter ouput to be a duplicate of input.

Delimiters filter breaks input up to 8 trunks separated by **Binary String**. Each trunk will not contain the delimiters.

Binary filter breaks input into 3 trunks according to **Offset** and **Length**.

Mode may be "All", "Delimiters" or "Binary".

value Delimiter Binary String

Sets **Binary String** delimiter in binary format.

Delimiters break input up to 8 trunks separated by (but not containing) delimiters. A delimiter is recognized if any of the **Binary String** is completely matched.

Binary format takes printable characters (e.g. 'abc' for characters 'a', 'b' and 'c') or binary string (e.g. [0xa, 0xd] for line feed and carriage return).

Binary String may contain up to 6 bytes.

value Start Index

Sets **Start Index** to indicate when **Delimiters** filter starts breaking input into trunks.

value Offset

Sets **Offset** for the size of the first trunk of data created by **Binary** Filter.

Offset has units of bytes.

value Length

Sets **Length** for the size of the second trunk of data created by **Binary** Filter. The third trunk of data created by **Binary** Filter will contain the rest of input.

Length has units of bytes.

configgroup Monitor Data

These settings pertain to **Monitor Data** in the device.

Data configured here will be accessible through the status of **Monitor**.

configitem Selector

value Name

Sets **Name** to enable the data selector.

Name may contain up to 16 characters.

value Response

Sets **Response** instance to select the source of data. Response instance corresponds to Poll or Control Message instance.

Blank the value for "<None>".

value Reference

Sets the **Reference** in dot number format.

Reference selects the output of **Monitor Filter**. E.g. If data should select the second trunk of data created by filter 1, **Reference** must be set to "1.2". A **Reference** of "0" indicates the raw response.

Dot number format could be "0" or two numbers separated by a dot (e.g. "1.2").

Reference may contain up to 6 characters.

configgroup Tunnel Accept

Tunnel Accept Mode controls how a tunnel behaves when a connection attempt originates from the network.

configitem Mode

value

An Accept Tunnel can be started in a number of ways, according to its **Mode**:

Disabled: never started.

Always: always started.

Any Character: started when any character is read on the Serial Line.

Start Character: started when the Start Character is read on the Serial Line.

Modem Control Asserted: started when the Modem Control pin is asserted on the Serial Line.

Mode may be "Disable", "Always", "Any Character", "Start Character" or "Modem Control Asserted".

configitem Local Port

value

The **Local Port** value can be overridden. By default, it is 10001 for Tunnel 1, 10002 for Tunnel 2, and so on.

Blank the display field to restore the default.

configitem Protocol

value

The **Protocol** used on the connection can be TCP.

Protocol may be "TCP".

configitem Start Character

value

When the **Start Character** is received on the Serial Line, it enables the tunnel to listen for a network connection.

The **Start Character** may be designated as a single printable character or as a control character.

Control characters may be input in any of the following forms:

<control>J

0xA (hexadecimal)

\10 (decimal)

Start Character may contain one character, where <control>J, for example, counts as one.

configitem Flush Start Character

value

Enabling **Flush Start Character** prevents forwarding of a start character from the Line into the network.

Disabling **Flush Start Character** allows forwarding of a start character from the Line into the network.

Flush Start Character may be "Enabled" or "Disabled".

configitem Flush Line

value

Flush Line applies at the time when a connection is accepted from the network.

If **Enabled**, any buffered characters from the Serial Line will be discarded when a connection is accepted.

If **Disabled**, any characters received on the Serial Line will be buffered and sent after a connection is accepted.

Flush Line may be "Enabled" or "Disabled".

configitem Block Line

value

Block Line may be enabled for debugging purposes.

If **Enabled**, incoming characters from the Serial Line will NOT be forwarded to the network. Instead, they will be buffered and will eventually flow off the Serial Line if hardware or software flow control is configured.

If **Disabled** (the normal setting), incoming characters from the Serial Line are sent on into the network. Any buffered characters are sent first.

Block Line may be "Enabled" or "Disabled".

configitem Block Network

value

Block Network may be enabled for debugging purposes.

If **Enabled**, incoming characters from the network will NOT be forwarded to the Serial Line. Instead, they will be buffered and will eventually flow off the network side.

If **Disabled** (the normal setting), incoming characters from the network are sent on into the Serial Line. Any buffered characters are sent first.

Block Network may be "Enabled" or "Disabled".

configitem Password

value

The **Password** can be up to 31 characters in length and must contain only alphanumeric characters and punctuation. When set, clients must send the correct password string to the unit within 30 seconds from opening network connection in order to enable data transmission. The password sent to the unit must be terminated with one of the following:

0A (Line Feed)

00 (Null)

0D 0A (Carriage Return / Line Feed)

0D 00 (Carriage Return / Null)

If **Prompt for Password** is set to Enabled, the user will be prompted for the password upon connection.

Password may contain up to 31 characters.

The value is HIDDEN.

configitem Prompt for Password

value

Prompt for Password may be "Enabled" or "Disabled".

configgroup Tunnel Line

The **Line** Configuration applies to the Serial Line interface.

See also the Line configuration.

configitem DTR

value

The **DTR** options select the conditions in which the **Data Terminal Ready** control signal on the Serial Line is asserted.

The **DTR** option **Asserted while connected** causes DTR to be asserted whenever either a connect or an accept mode tunnel connection is active.

DTR may be "Asserted while connected", "Continuously asserted" or "Unasserted".

configgroup Tunnel Connect

Tunnel Connect controls how a tunnel behaves when a connection attempt originates locally.

configitem Mode

value

A Connect Tunnel can be started in a number of ways, according to its **Mode**:

Disabled: never started.

Always: always started.

Any Character: started when any character is read on the Serial Line.

Start Character: started when the Start Character is read on the Serial Line.

Modem Control Asserted: started when the Modem Control pin is asserted on the Serial Line.

Mode may be "Disable", "Always", "Any Character", "Start Character" or "Modem Control Asserted".

configitem Start Character

value

When the **Start Character** is received on the Serial Line, it connects the tunnel.

The **Start Character** may be designated as a single printable character or as a control character.

Control characters may be input in any of the following forms:

<control>J

0xA (hexadecimal)

\10 (decimal)

Start Character may contain one character, where <control>J, for example, counts as one.

configitem Flush Start Character

value

Enabling **Flush Start Character** prevents forwarding of a start character from the Line into the network.

Disabling **Flush Start Character** allows forwarding of a start character from the Line into the network.

Flush Start Character may be "Enabled" or "Disabled".

configitem Local Port

value

The **Local Port** is by default random but can be overridden.

Blank the field to restore the random default.

Blank the value for "<Random>".

configitem Host

value Address

The **Host Address** is required to enable a Connect Tunnel.

It designates the address of the remote host to connect to.

Either a DNS address or an IP address may be provided.

Address may contain up to 50 characters.

value Port

The **Host Port** is required to enable a Connect Tunnel.

It designates the TCP port on the remote host to connect to.

Blank the value for "<None>".

value Protocol

The **Protocol** used on the connection can be TCP.

Protocol may be "TCP".

configitem Connections

value

Connections controls how multiple hosts shall be used with a Connect Tunnel.

With **Sequential** selected, when it is time for the tunnel to connect, it will start with host 1 and attempt each host in sequence until a connection is accepted.

With **Simultaneous** selected, when it is time for the tunnel to connect, it will connect to all of the hosts that accept a connection.

Connections may be "Sequential" or "Simultaneous".

configitem Reconnect Time

value

The **Reconnect Time** specifies how long to wait in seconds before trying to reconnect to the remote host after a previous attempt failed or the connection was closed.

Blank the display field to restore the default.

Reconnect Time has units of seconds.

configitem Flush Line

value

Flush Line applies at the time when a connection is established to the network.

If **Enabled**, any buffered characters from the Serial Line will be discarded when a connection is established.

If **Disabled**, any characters received on the Serial Line will be buffered and sent after a connection is established.

Flush Line may be "Enabled" or "Disabled".

configitem Block Line

value

Block Line may be enabled for debugging purposes.

If **Enabled**, incoming characters from the Serial Line will NOT be forwarded to the network. Instead, they will be buffered and will eventually flow off the Serial Line if hardware or software flow control is configured.

If **Disabled** (the normal setting), incoming characters from the Serial Line are sent on into the network. Any buffered characters are sent first.

Block Line may be "Enabled" or "Disabled".

configitem Block Network

value

Block Network may be enabled for debugging purposes.

If **Enabled**, incoming characters from the network will NOT be forwarded to the Serial Line. Instead, they will be buffered and will eventually flow off the network side.

If **Disabled** (the normal setting), incoming characters from the network are sent on into the Serial Line. Any buffered characters are sent first.

Block Network may be "Enabled" or "Disabled".

configgroup Tunnel Disconnect

These settings relate to Disconnecting a Tunnel.

configitem Stop Character

value

When the **Stop Character** is received on the Serial Line, it disconnects the tunnel.

The **Stop Character** may be designated as a single printable character or as a control character.

Control characters may be input in any of the following forms:

<control>J

0xA (hexadecimal)

\10 (decimal)

Disable the **Stop Character** by blanking the field to set it to <None>.

Stop Character may contain one character, where <control>J, for example, counts as one.

configitem Flush Stop Character

value

Enabling **Flush Stop Character** prevents forwarding of a stop character from the Line into the network.

Disabling **Flush Stop Character** allows forwarding of a stop character from the Line into the network.

Flush Stop Character may be "Enabled" or "Disabled".

configitem Modem Control

value

Modem Control enables disconnect when the Modem Control pin is not asserted on the Serial Line.

Modem Control may be "Enabled" or "Disabled".

configitem Timeout

value

Timeout enables disconnect after the tunnel is idle for a specified number of milliseconds. The value of zero disables the idle timeout.

Timeout has units of milliseconds.

Blank the value for "<Disabled>".

configitem Flush Line

value

Flush Line enabled will flush the Serial Line when the Tunnel is disconnected.

Flush Line may be "Enabled" or "Disabled".

configgroup Tunnel Packing

When Tunneling, instead of sending data on the network immediately after being read on the Serial Line, the data can be **Packed** (queued) and sent in larger chunks.

configitem Mode

value

A Tunnel can be configured to use Packing **Mode** in the following ways:

Disable: data not packed.

Timeout: data sent after timeout occurs.

Send Character: data sent when the Send Character is read on the Serial Line.

Mode may be "Disable", "Timeout" or "Send Character".

configitem Timeout

value

If the oldest byte of queued data has been waiting for **Timeout** milliseconds, the queued data will be sent on the network immediately.

Timeout has units of milliseconds.

configitem Threshold

value

If the number of bytes of queued data reaches the **Threshold**, the queued data will be sent on the network immediately.

Threshold has units of bytes.

configitem Send Character

value

If used, the **Send Character** is a single printable character or a control character that, when read on the Serial Line, forces the queued data to be sent on the network immediately.

Control characters may be input in any of the following forms:

<control>J

0xA (hexadecimal)

\10 (decimal)

Send Character may contain one character, where <control>J, for example, counts as one.

configitem Trailing Character

value

The **Trailing Character** is an optional single printable character or control character that is injected into the outgoing data stream right after the **Send Character**.

Control characters may be input in any of the following forms:

<control>J

0xA (hexadecimal)

\10 (decimal)

Disable the **Trailing Character** by blanking the field to set it to <None>.

> **Trailing Character** may contain one character, where <control>J, for example, counts as one.

Appendix B: WebAPI

WebAPI is a cloud function API allowing access to configuration and status information of xPico Wi-Fi embedded device server through standard HTTP request.

Export Status Group

An HTTP POST request can be sent to the device to retrieve status information.

Protocol: HTTP

Method: Post

URL: http://<hostname>/export/status

Parameters:

optionalLine: Optional line index for line oriented XML groups

optionalGroupList: Optional list of XML groups separated by semicolon. If omitted, all status groups will be returned.

CURL example:

```
curl -u admin:PASSWORD http://172.19.100.125/export/status -X POST
curl -u admin:PASSWORD http://172.19.100.125/export/status -X POST -d
"optionalGroupList=Device"
Javascript example:
myXmlhttprequest.open(
   "POST",
    "/export/status",
    true
);
request.send(
    "optionalGroupList=Device"
);
```

Export Configuration Group

An HTTP POST request can be sent to the device to retrieve configuration information.

Protocol: HTTP

Method: Post

URL: http://<hostname>/export/config

Parameters:

optionalLine: Optional line index for line oriented XML groups

optionalGroupList: Optional list of XML groups separated by semicolon. If omitted, all configuration groups will be returned.

optionalBoolNeedSecret: To retrieve the original value for hidden configuration, set this to "true".

CURL example:

```
curl -u admin:PASSWORD http://172.19.100.125/export/config -X POST
curl -u admin:PASSWORD http://172.19.100.125/export/config -X POST -d
"optionalGroupList=Interface:wlan0"
Javascript example:
myXmlhttprequest.open(
   "POST",
    "/export/config",
    true
);
request.send(
    "optionalGroupList= Interface:wlan0"
);
```

Take Status Action

An HTTP POST request can be sent to the device to take a status action.

Protocol: HTTP

Method: Post

URL: http://<hostname>/action/status

Parameters:

group: Required. The status group where action is defined.

optionalGroupInstance: Optional instance of status group.

optionalItem: Optional item of status group where action is defined.

optionalItemInstance: Optional instance of status item.

action: Required. The action to be taken.

CURL example:

```
curl -u admin:PASSWORD http://172.19.100.125/action/status -X POST -d
"group=Interface&optionalGroupInstance=wlan0&action=Renew"

Javascript example:
myXmlhttprequest.open(
   "POST",
    "/action/status",
    true
);
request.send(
    " group=Interface&optionalGroupInstance=wlan0&action=Renew "
);
```

Import Configuration Group

An HTTP POST request can be sent to the device to set configuration.

Protocol: HTTP

Method: Post

Content-Type: multipart/form-data

URL: http://<hostname>/import/config

Parameters:

configrecord: Content of configuration group in XML format.

CURL example (configuration is saved in a local file config.xml):

```
curl -u admin:PASSWORD http://172.19.100.125/import/config -X POST --
form configrecord=@config.xml
```

CURL example (configuration as part of command):

```
curl -u admin:PASSWORD http://172.19.100.125/import/config -X POST --
form-string 'configrecord=<?xml version="1.0" standalone="yes"?>
<!-- Automatically generated XML -->
<!DOCTYPE configrecord [
   <!ELEMENT configrecord (configgroup+)>
   <!ELEMENT configgroup (configitem+)>
   <!ELEMENT configitem (value+)>
   <!ELEMENT value (#PCDATA)>
   <!ATTLIST configrecord version CDATA #IMPLIED>
   <!ATTLIST configgroup name CDATA #IMPLIED>
   <!ATTLIST configgroup instance CDATA #IMPLIED>
   <!ATTLIST configitem name CDATA #IMPLIED>
   <!ATTLIST configitem instance CDATA #IMPLIED>
   <!ATTLIST value name CDATA #IMPLIED>
]>
<configrecord version = "0.1.0.1">
   <configgroup name = "Access Point" instance = "ap0">
      <configitem name = "SSID">
         <value>MY DEVICE</value>
      </configitem>
   </configgroup>
</configrecord>'

HTTP example:
<form method="post" enctype="multipart/form-data" action="/import/
config" target="_blank">
    <input name="configrecord" type="file" size="32">
     <input name="submit" type="submit" value="Import Configuration">
 </form>
```

Appendix C: Technical Support

If you are unable to resolve an issue using the information in this documentation, please contact Technical Support.

North America

Hours: 6:00am - 5:00pm Pacific Time

Mon. - Fri. (excluding holidays)

www.lantronix.com/support/

FTP: ftp.lantronix.com

Tel: (800) 422-7044 (US Only)

Tel: (949) 453-7198

Fax: (949) 450-7226

Europe, Middle East, Africa (EMEA)

www.lantronix.com/support/

Tel: +31 (0)76 52 36 740

Japan

japan_sales@lantronix.com

Tel: +81-3-6277-8802

Asia / Pacific (APAC)

asiapacific_sales@lantronix.com

Tel: + 852 3428-2338

China

Shanghai@lantronix.com

Tel: + 86-21-6237-8868

Tel: 400-820-0502

Latin America & Caribbean

la_sales@lantronix.com

Tel: +1 949 453 3990

Online

Support options listed below are available 24 hours a day, 7 days a week at the Lantronix support page at http://www.lantronix.com/support

- Download firmware
- Search and review Frequently asked Questions (FAQs)
- Send a question to technical support

When you report a problem, please provide the following information:

- Your name, and your company name, address, and phone number
- Lantronix model number
- Lantronix serial number/MAC address
- Firmware version (on the Web Manager Status page or via CLI at the Status->Device level)
- Description of the problem
- Status of the unit when the problem occurred (please try to include information on user and network activity at the time of the problem)
- Additionally, it may be useful to export and submit the exported XML Configuration file.

Appendix D: Compliance

(According to ISO/IEC Guide and EN 45014)

Manufacturer's Name & Address:

Lantronix, Inc.
167 Technology Drive, Irvine, CA 92618 USA

Declares that the following product:

Product Name Model: xPico® Wi-Fi® Embedded Device Server

Conforms to the following standards or other normative documents:

Table D-1 Country Certifications

Country	Specification
USA	FCC Part 15, Subpart B, Class B ICES-003:2012 Issue 5, Class B ANSI C63.4-2009
USA	FCC Part 15, Subpart C (Section 15.247) ANSI C63.10-2009 FCC Part 2 (Section 2.1091) FCC OET Bulletin 65, Supplement C (01-01) IEEE C95.1
Canada	Canada RSS-210 Issue 8 (2010-12) Canada RSS-Gen Issue 3 (2010-12) ANSI C63.10-2009 RSS-102 Issue 4 (2010-12)
EU	EN 300 328 V1.8.1 (2012-06) EN 301 489-1 V1.9.2 (2011-09) EN 301 489-17 V2.2.1 (2012-09) EN 55022:2010+AC:2011, Class B EN62311:2008
Australia, New Zealand N11206	AS/NZS 4268: 2012
Japan	ARIB STD-T66, MIC notice 88 Appendix 43 RCR STD-33, MIC notice 88 Appendix 44

Table D-2 Country Transmitter IDs

Country	Specification
USA FCC ID	R68XPICOW
Canada IC ID	3867A-XPICOW
Japan ID	201-135275

Table D-3 Safety

Country	Specification
World Wide CE0560	CB EN 60950-1:2006 + A11:2009 + A1:2010 + A12:2011 In accordance with the council directive 2006/95/EC
US, Canada	UL 60950-1 (2nd Edition)

Hereby, Lantronix, declares that this xPico Wi-Fi is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.

Table D-4 Europe – EU Declaration of Conformity

cs Česky [Czech]	*Lantronix, Inc.* tímto prohlašuje, že tento *xPico Wi-Fi* je ve shodě se základními požadavky a dalšími příslušnými ustanoveními směrnice 1999/5/ES.
da Dansk [Danish]	Undertegnede *Lantronix, Inc.* erklærer herved, at følgende udstyr *xPico Wi-Fi* overholder de væsentlige krav og øvrige relevante krav i direktiv 1999/5/EF.
de Deutsch [German]	Hiermit erklärt *Lantronix, Inc.*, dass sich das Gerät *xPico Wi-Fi* in Übereinstimmung mit den grundlegenden Anforderungen und den übrigen einschlägigen Bestimmungen der Richtlinie 1999/5/EG befindet.
et Eesti [Estonian]	Käesolevaga *Lantronix, Inc.* seadme *xPico Wi-Fi* vastavust direktiivi 1999/5/EÜ põhinõuetele ja nimetatud direktiivist tulenevatele teistele asjakohastele sätetele.
en English	Hereby, *Lantronix, Inc.*, declares that this *xPico Wi-Fi* is in compliance with the essential requirements and other relevant provisions of Directive 1999/5/EC.
es Español [Spanish]	Por medio de la presente *Lantronix, Inc.* declara que el *xPico Wi-Fi* cumple con los requisitos esenciales y cualesquiera otras disposiciones aplicables o exigibles de la Directiva 1999/5/CE.
el Ελληνική [Greek]	ΜΕ ΤΗΝ ΠΑΡΟΥΣΑ *Lantronix, Inc.* ΔΗΛΩΝΕΙ ΟΤΙ *xPico Wi-Fi* ΣΥΜΜΟΡΦΩΝΕΤΑΙ ΠΡΟΣ ΤΙΣ ΟΥΣΙΩΔΕΙΣ ΑΠΑΙΤΗΣΕΙΣ ΚΑΙ ΤΙΣ ΛΟΙΠΕΣ ΣΧΕΤΙΚΕΣ ΔΙΑΤΑΞΕΙΣ ΤΗΣ ΟΔΗΓΙΑΣ 1999/5/ΕΚ.
fr Français [French]	Par la présente *Lantronix, Inc.* déclare que l'appareil *xPico Wi-Fi* est conforme aux exigences essentielles et aux autres dispositions pertinentes de la directive 1999/5/CE.
it Italiano [Italian]	Con la presente *Lantronix, Inc.* dichiara che questo *xPico Wi-Fi* è conforme ai requisiti essenziali ed alle altre disposizioni pertinenti stabilite dalla direttiva 1999/5/CE.
Latviski [Latvian]	Ar šo *Lantronix, Inc.* deklarē, ka *xPico Wi-Fi* atbilst Direktīvas 1999/5/EK būtiskajām prasībām un citiem ar to saistītajiem noteikumiem.
Lietuvių [Lithuanian]	Šiuo *Lantronix, Inc.* deklaruoja, kad šis *xPico Wi-Fi* atitinka esminius reikalavimus ir kitas 1999/5/EB Direktyvos nuostatas.
nl Nederlands [Dutch]	Hierbij verklaart *Lantronix, Inc.* dat het toestel *xPico Wi-Fi* in overeenstemming is met de essentiële eisen en de andere relevante bepalingen van richtlijn 1999/5/EG.
mt Malti [Maltese]	Hawnhekk, *Lantronix, Inc.]*, jiddikjara li dan *xPico Wi-Fi* jikkonforma mal-ħtiġijiet essenzjali u ma provvedimenti oħrajn relevanti li hemm fid-Dirrettiva 1999/5/EC.
hu Magyar [Hungarian]	Alulírott, *Lantronix, Inc.* nyilatkozom, hogy a *xPico Wi-Fi* megfelel a vonatkozó alapvetõ követelményeknek és az 1999/5/EC irányelv egyéb elõírásainak.
pl Polski [Polish]	Niniejszym *Lantronix, Inc.* oświadcza, że *xPico Wi-Fi* jest zgodny z zasadniczymi wymogami oraz pozostałymi stosownymi postanowieniami Dyrektywy 1999/5/EC.
pt Português [Portuguese]	*Lantronix, Inc.* declara que este *xPico Wi-Fi* está conforme com os requisitos essenciais e outras disposições da Directiva 1999/5/CE.

Table D-4 Europe – EU Declaration of Conformity (continued)

sl Slovensko [Slovenian]	*Lantronix, Inc.* izjavlja, da je ta *xPico Wi-Fi* v skladu z bistvenimi zahtevami in ostalimi relevantnimi določili direktive 1999/5/ES.
Slovensky [Slovak]	*Lantronix, Inc.* týmto vyhlasuje, že *xPico Wi-Fi* spĺňa základné požiadavky a všetky príslušné ustanovenia Smernice 1999/5/ES.
fi Suomi [Finnish]	*Lantronix, Inc.* vakuuttaa täten että *xPico Wi-Fi* tyyppinen laite on direktiivin 1999/5/EY oleellisten vaatimusten ja sitä koskevien direktiivin muiden ehtojen mukainen.
sv Svenska [Swedish]	Härmed intygar *Lantronix, Inc.* att denna *xPico Wi-Fi* står I överensstämmelse med de väsentliga egenskapskrav och övriga relevanta bestämmelser som framgår av direktiv 1999/5/EG.

Federal Communication Commission Interference Statement

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

***FCC Caution**: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.*

This transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Radiation Exposure Statement

This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

This device is intended only for OEM integrators under the following conditions:

1. The antenna must be installed such that 20 cm is maintained between the antenna and users, and
2. The transmitter module may not be co-located with any other transmitter or antenna.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed

IMPORTANT NOTE: *In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.*

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: “Contains FCC ID: R68XPICOW”. The grantee's FCC ID can be used only when all FCC compliance requirements are met.

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user’s manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

Industry Canada Statement

This device complies with RSS-210 of the Industry Canada Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Ce dispositif est conforme à la norme CNR-210 d'Industrie Canada applicable aux appareils radio exempts de licence. Son fonctionnement est sujet aux deux conditions suivantes: (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

Radiation Exposure Statement

This equipment complies with IC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Déclaration d'exposition aux radiations

Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de 20 cm de distance entre la source de rayonnement et votre corps.

This device is intended only for OEM integrators under the following conditions: (For module device use)

1. The antenna must be installed such that 20 cm is maintained between the antenna and users, and
2. The transmitter module may not be co-located with any other transmitter or antenna.

As long as 2 conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

Cet appareil est conçu uniquement pour les intégrateurs OEM dans les conditions suivantes: (Pour utilisation de dispositif module)

L'antenne doit être installée de telle sorte qu'une distance de 20 cm est respectée entre l'antenne et les utilisateurs, et

Le module émetteur peut ne pas être coïmplanté avec un autre émetteur ou antenne.

Tant que les 2 conditions ci-dessus sont remplies, des essais supplémentaires sur l'émetteur ne seront pas nécessaires. Toutefois, l'intégrateur OEM est toujours responsable des essais sur son produit final pour toutes exigences de conformité supplémentaires requis pour ce module installé.

IMPORTANT NOTE: *In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the Canada authorization is no longer considered valid and the IC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate Canada authorization.*

NOTE IMPORTANTE: *Dans le cas où ces conditions ne peuvent être satisfaites (par exemple pour certaines configurations d'ordinateur portable ou de certaines co-localisation avec un autre émetteur), l'autorisation du Canada n'est plus considéré comme valide et l'ID IC ne peut pas être utilisé sur le produit final. Dans ces circonstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y compris l'émetteur) et l'obtention d'une autorisation distincte au Canada.*

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following:

“Contains IC: 3867A-XPICOW".

Plaque signalétique du produit final

Ce module émetteur est autorisé uniquement pour une utilisation dans un dispositif où l'antenne peut être installée de telle sorte qu'une distance de 20cm peut être maintenue entre l'antenne et les utilisateurs. Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contient des IC: 3867A-XPICOW".

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user’s manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

Manuel d'information à l'utilisateur final

L'intégrateur OEM doit être conscient de ne pas fournir des informations à l'utilisateur final quant à la façon d'installer ou de supprimer ce module RF dans le manuel de l'utilisateur du produit final qui intègre ce module.

Le manuel de l'utilisateur final doit inclure toutes les informations réglementaires requises et avertissements comme indiqué dans ce manuel.

Antenna Requirement

This device has been designed to operate with a PIFA antenna have a maximum gain of 2.5dBi. Antenna having a higher gain is strictly prohibited per regulations of Industry Canada. The required antenna impedance is 50 ohms.

Under Industry Canada regulations, this radio transmitter may only operate using an antenna of a type and maximum (or lesser) gain approved for the transmitter by Industry Canada. To reduce potential radio interference to other users, the antenna type and its gain should be so chosen that the equivalent isotropically radiated power (e.i.r.p.) is not more than that necessary for successful communication.

This radio transmitter xPico Wi-Fi has been approved by Industry Canada to operate with the antenna type, maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this user's manual, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Ce dispositif a été conçu pour fonctionner avec une antenne ayant un gain maximal de PIFA antenne avec dBi 2.5. Une antenne à gain plus élevé est strictement interdite par les règlements d'Industrie Canada. L'impédance d'antenne requise est de 50 ohms.

Conformément à la réglementation d'Industrie Canada, le présent émetteur radio peutfonctionner avec une antenne d'un type et d'un gain maximal (ou inférieur) approuvé pourl'émetteur par Industrie Canada. Dans le but de réduire les risques de brouillage radioélectriqueà l'intention des autres utilisateurs, il faut choisir le type d'antenne et son gain de sorte que lapuissance isotrope rayonnée équivalente (p.i.r.e.) ne dépasse pas l'intensité nécessaire àl'établissement d'une communication satisfaisante.

Le présent émetteur radio xPico Wi-Fi a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

Table D-5 Approved Antenna(s) List

Type	Gain	Brand
PIFA	2.5dBi	ethertronics
Dipole	2.38	Wanshih

Manufacturer's Contact:

Lantronix, Inc.
167 Technology Drive, Irvine, CA 92618 USA
Tel: 949-453-3990
Fax: 949-453-3995

RoHS Notice

All Lantronix products in the following families are China RoHS-compliant and free of the following hazardous substances and elements:

- Lead (Pb)
- Cadmium (Cd)
- Mercury (Hg)
- Hexavalent Chromium (Cr (VI))
- Polybrominated biphenyls (PBB)
- Polybrominated diphenyl ethers (PBDE)

Product Family Name	Toxic or hazardous Substances and Elements					
	Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent Chromium (Cr (VI))	Polybrominated biphenyls (PBB)	Polybrominated diphenyl ethers (PBDE)
DSC	0	0	0	0	0	0
EDS	0	0	0	0	0	0
IntelliBox	0	0	0	0	0	0
MatchPort	0	0	0	0	0	0
Micro	0	0	0	0	0	0
MSS100	0	0	0	0	0	0
PremierWave	0	0	0	0	0	0
SCS	0	0	0	0	0	0
SecureBox	0	0	0	0	0	0
SLB	0	0	0	0	0	0
SLC	0	0	0	0	0	0
SLP	0	0	0	0	0	0
Spider and Spider Duo	0	0	0	0	0	0
UBox	0	0	0	0	0	0
UDS1100 and 2100	0	0	0	0	0	0
WiBox	0	0	0	0	0	0
WiPort	0	0	0	0	0	0
xDirect	0	0	0	0	0	0
xPico	0	0	0	0	0	0
xPico Wi-Fi	0	0	0	0	0	0
XPort	0	0	0	0	0	0
XPort Pro	0	0	0	0	0	0
XPress DR & XPress-DR+	0	0	0	0	0	0
xPrintServer	0	0	0	0	0	0
xSenso	0	0	0	0	0	0

O: toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006.

X: toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006.

Appendix E: Binary to Hexadecimal Conversions

Many unit configuration procedures require you to assemble a series of options (represented as bits) into a complete command (represented as a byte).

The resulting binary value must be converted to a hexadecimal representation.

Use this chapter to learn to convert binary values to hexadecimals or to look up hexadecimal values in the tables of configuration options. The tables include:

- Command Mode (serial string sign-on message)
- AES Keys

Converting Binary to Hexadecimal

Following are two simple ways to convert binary numbers to hexadecimal notation.

Conversion Table

Hexadecimal digits have values ranging from 0 to F, which are represented as 0-9, A (for 10), B (for 11), etc. To convert a binary value (for example, 0100 1100) to a hexadecimal representation, treat the upper and lower four bits separately to produce a two-digit hexadecimal number (in this case, 4C). Use the following table to convert values from binary to hexadecimal.

Scientific Calculator

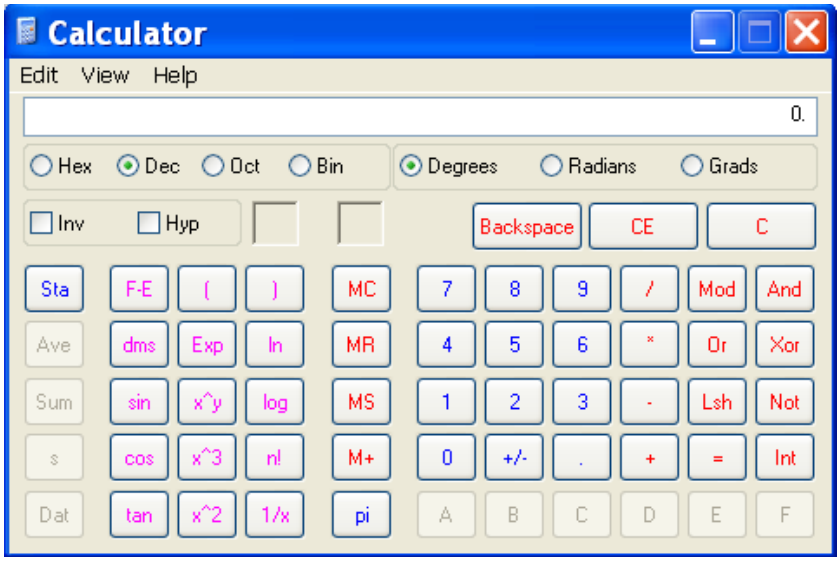
Another simple way to convert binary to hexadecimal is to use a scientific calculator, such as the one available on the Windows operating systems. For example:

1. On the Windows Start menu, click **All Programs -> Accessories -> Calculator**.
2. On the View menu, select **Scientific**. The scientific calculator appears.
3. Click **Bin** (Binary), and type the number you want to convert.

Table E-1 Binary to Hexadecimal Conversion

Decimal	Binary	Hex
0	0000	0
1	0001	1
2	0010	2
3	0011	3
4	0100	4
5	0101	5
6	0110	6
7	0111	7
8	1000	8
9	1001	9
10	1010	A
11	1011	B
12	1100	C
13	1101	D
14	1110	E
15	1111	F

Figure E-2 Windows Scientific Calculator



4. Click **Hex**. The hexadecimal value appears.

Figure E-3 Hexadecimal Values in the Scientific Calculator